The Chemical Age

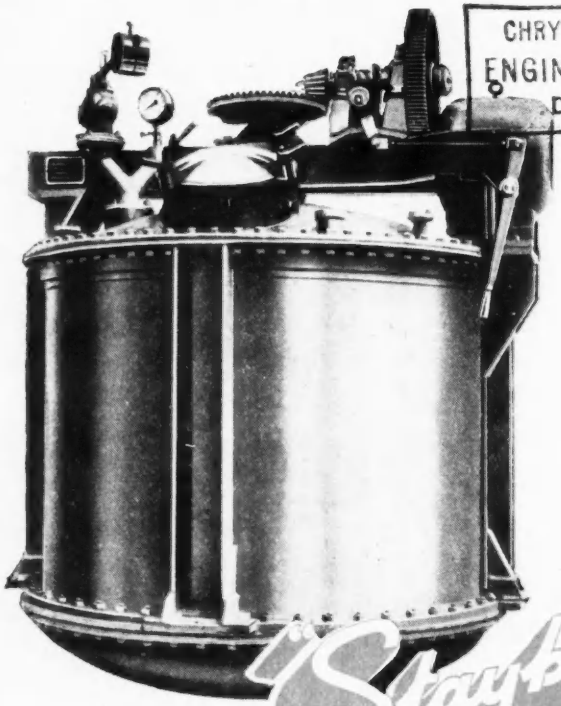
A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LIV
No. 1388

SATURDAY, FEBRUARY 2, 1946
REGISTERED AS A NEWSPAPER

6D. PER COPY
POST FREE 8D.

CHRYSLER CORPORATION
ENGINEERING LIBRARY
DETROIT, MICH.



"Staybrite"

750-gallon "Staybrite" steel electrically welded copal gum pot fitted with stirring gear and motor.

Working pressure—
28 lbs. sq. inch

IS MUCH USED FOR
ALL TYPES OF
MIXING PLANT

FIRTH-VICKERS STAINLESS STEELS LTD SHEFFIELD

Heat can destroy your plant!

- You know all about fire hazards, and guard against them. Fire is spectacular. It blazes and destroys. But what are you doing about HEAT ?

Insidiously, irrevocably, heat saps the strength of metals, impairs the efficiency of plant. Guard against it !

For all high temperature work where steel's strength is needed, use

MAXHETE

heat resisting steels or

MAXILVRY A.W.P.

stainless steel

Pots, retorts, rabble arms, rabble blades, oil burner parts, furnace parts, carburizing boxes, etc., etc., can all be successfully made from these steels.

- Fluctuating temperatures up to 1150°C resisted. The above steels are also resistant to corrosion.
- Write for details of applications, temperatures withstood, safe working loads, etc., to

EDGAR ALLEN & Co. Ltd.

IMPERIAL STEEL WORKS, SHEFFIELD, 9

- *Also tool steels, steel castings, complete drying, disintegrating, crushing and grinding plants, etc.*

Wire Baskets and other WIREWORK requirements for the Chemical and Allied Industries.

MACHINERY

MEASURED, DESIGNED, CONSTRUCTED & ERECTED **GUARDS**

F. W. POTTER & SOAR LTD

PHIPP STREET, LONDON, E.C.2

Telephone : BIShopsgate 2177.

"SIMPLICITY"

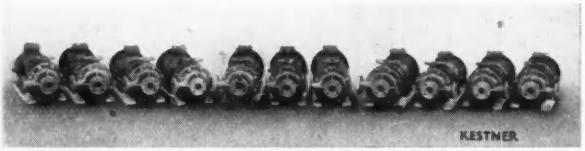
STEAM TRAPS

LAND AND MARINE TYPES
HIGHEST EFFICIENCY
SIMPLE ACTION

KEY ENGINEERING CO. LTD.

4 QUEEN VICTORIA STREET, LONDON AND MANCHESTER

A NEW ACID PUMP
GLANDLESS—SELF-PRIMING



PATENT GLANDLESS ACID PUMPS

- NO PACKING GLAND
- NO BEARING SURFACE IN CONTACT WITH ACID
- MADE IN SPECIAL MATERIALS RESISTANT TO ALL CORROSIVE LIQUIDS
- LONG AND TROUBLE-FREE LIFE ASSURED
- SELF-STARTING EVEN AFTER A LONG SHUT-DOWN.

Full Particulars from:

KESTNER'S

Chemical Engineers 5, GROSVENOR GARDENS, LONDON, S.W.1

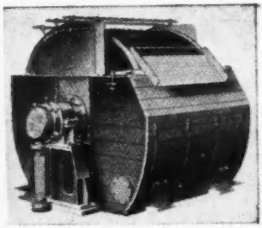
UNIFLOC
REGD. TRADE MARK

Plant for the Chemical Industry

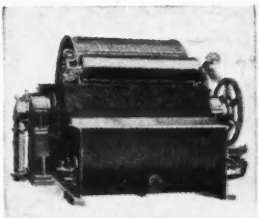
for ACID NEUTRALIZATION, CLARIFICATION OF LIQUIDS, DEWATERING OF SLUDGES, EFFLUENT PURIFICATION, FILTRATION AND FLOCCULATION, PICKLING LIQUOR TREATMENT, PURIFICATION OF TRADE WASTE, SEDIMENTATION AND THICKENING, SEPARATION OF SOLIDS FROM LIQUIDS, SODA RECOVERY. WET MATERIAL HANDLING

including

AGITATORS, CAUSTICIZERS, CLARIFIERS, CLASSIFIERS, CONVEYORS, DEWATERING MACHINES ROTARY VACUUM FILTERS, SAND WASHERS, SLUDGE PUMPS, THICKENERS, etc.



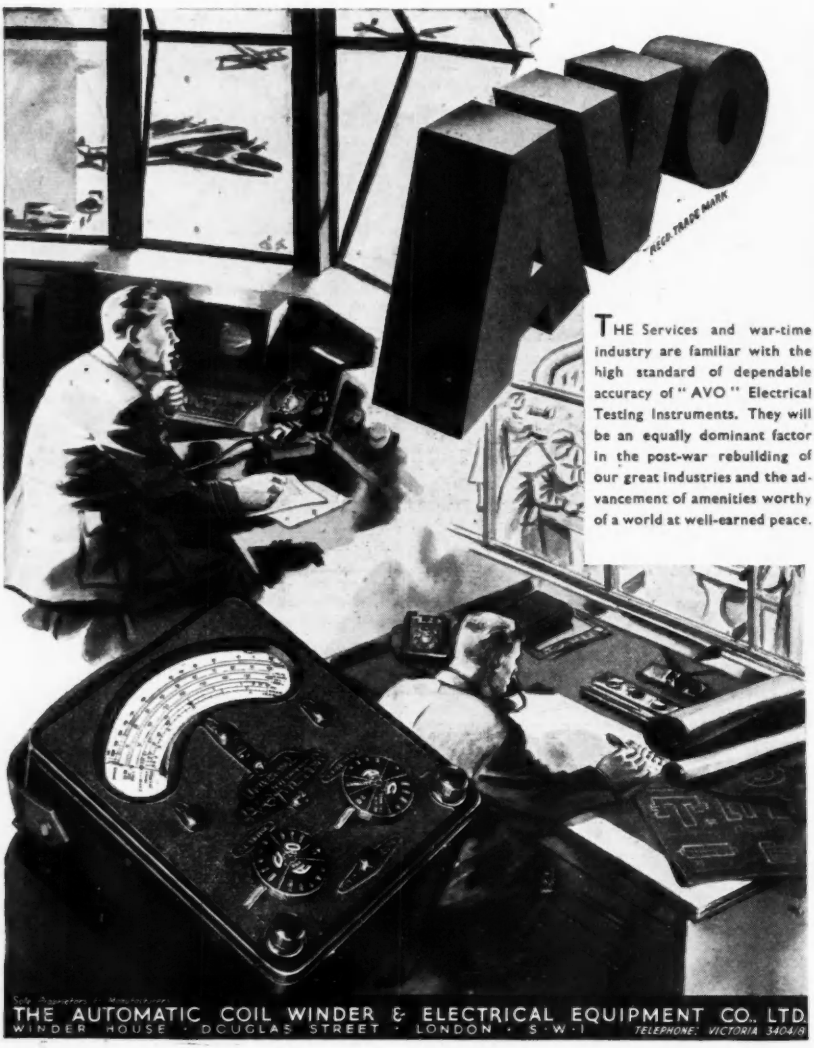
Rotary Pulp Washing Machine, with Pitch Pine Trough, Wash Gear and Scraper Knife.



Rotary Vacuum Filler, with Take-off Roller and Repulper.

UNIFLOC REAGENTS LTD.,
— SWANSEA —

Phone: Swansea 5164 (3 lines)
Grams: Unifloc, Swansea


AVO
REGD. TRADE MARK
THE Services and war-time industry are familiar with the high standard of dependable accuracy of "AVO" Electrical Testing Instruments. They will be an equally dominant factor in the post-war rebuilding of our great industries and the advancement of amenities worthy of a world at well-earned peace.
THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.
WINDER HOUSE · DOUGLAS STREET · LONDON · S.W.1
TELEPHONE: VICTORIA 3404/8

STAINLESS STEEL TANK

10,000 gallon tank of welded construction 30' long x 8' 6" diameter, fitted with branches and internal supports for heating coils, with fabricated supporting cradles of mild steel, of welded construction

WIDNES Foundry

& ENGINEERING COMPANY LIMITED

WORKS . WIDNES . LANCS.

LONDON OFFICE, BRETTENHAM HOUSE, W.C.2, TEMPLE BAR 9631

Proteins **YES**
Vitamins **YES**
High Food Value **YES** *.. these are the constituents of*

YESTAMIN

BRAND OF PURE DRIED YEAST

Yestamin is pure, dried, de-bittered Yeast—richest in Vitamins B1 and B2 — with a 40 per cent Protein content. It adds greatly to Food Value, and imparts an appetising, piquant flavour that results in increased demand for *your* Processed Foods.

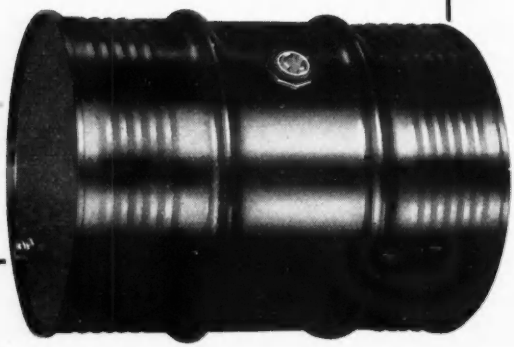
THE ENGLISH GRAINS CO. LTD., BURTON-ON-TRENT

It pays to pack in **C·E·C** *DRUMS*

It is more economical and efficient to pack in "C.E.C." Drums and Kegs. They are made specially for the job, and because of their strength and long life, can be used over and over again, ensuring a considerable saving in packing costs.

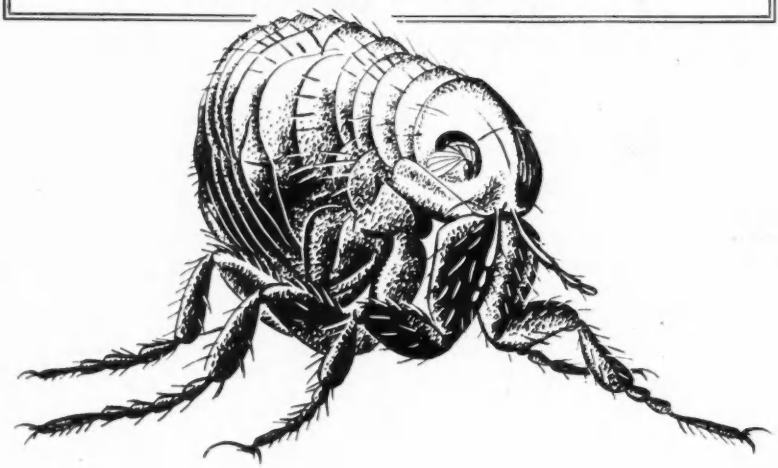
May we have your enquiries please ?

The CYCLOPS ENGINEERING CO. LTD.
VICTORIA CRESCENT
BURTON-ON-TRENT
Phone : 2085



Clinton-Wall

FLEAS *are rapidly destroyed by*
'GAMMEXANE' DUST D.034



THIS new insecticide powder not only kills the adult flea but remains effective long enough to destroy the tiny maggots as they emerge in search of food. 'Gammexane' will eliminate existing infestations and prevent fleas becoming established in clean premises.

It is invaluable in laundries, industrial change-rooms, public baths, etc.

It is safe to use and does not injure fabrics.

Available in limited quantities in 56-lb. and 1-cwt. packages.

Smaller quantities are repacked and sold by retailers.

'GAMMEXANE'

THE *New* BRITISH INSECTICIDE

ICI

'Gammexane' is the trade mark name of the gamma isomer of benzene hexachloride

IMPERIAL CHEMICAL INDUSTRIES LIMITED
NOBEL HOUSE, LONDON, S.W.1

G.3

SODIUM METASILICATE

THE NEW INDUSTRIAL ALKALI

effectively solves many problems requiring the use of a

HIGH-POWERED CLEANSER

which can be applied with

SAFETY & ECONOMY

Largely used in the Laundry and Textile Industries, Paper Mills, Dairies, Metal Cleaners, and as a constituent of Proprietary Articles.

Write for particulars to:

ALCOCK (Peroxide) LTD.

LUTON, Beds.

Telephone: 3144/5 Luton.

PYREX

REG^D TRADE MARK BRAND

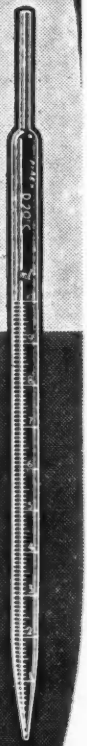
GRADUATED GLASSWARE

By specifying "PYREX Brand" when ordering Graduated Glassware you are assured of obtaining strong serviceable glassware, with division lines and numerals etched clearly and precisely, for easy reading.

For everyday laboratory work PYREX Brand Glassware is Graduated to **N. P. L. class B** standard, but for more meticulous analysis or intricate research work, **N. P. L. class A** can be supplied at the appropriate extra costs.

PYREX Brand Graduated Glassware is supplied only through Laboratory Furnishers, but illustrated catalogue and two free copies of our Chemist's Notebook will be sent direct on application to us.

Ask for PYREX Brand and see that you get it!



JAMES A. JOBLING & Co. Ltd.
WEAR GLASS WORKS
SUNDERLAND

G.36.

ATHOLE G. ALLEN (Stockton) LTD.

STOCKTON-ON-TEES,

Telephones :
STOCKTON 6375 (3 lines)

CO., DURHAM

NON MEMBERS OF TRADE ASSOCIATIONS

PRODUCE

and can

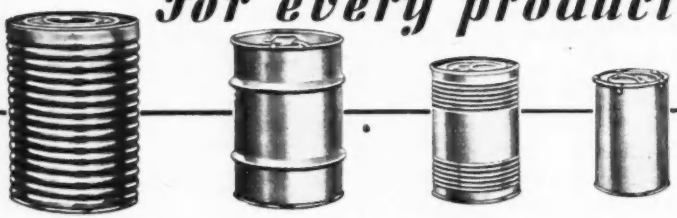
DELIVER

DINITROTOLUENE

FOR HOME and EXPORT

NOT SURPLUS WAR MATERIAL

For every product...



In a wide range of sizes and designs to meet the needs of all trades.

Drums and Kegs by

Be guided by years of experience and pack your product in a perfect steel package. If we can be helpful in solving any of your package problems we shall be happy to place our service at your disposal.

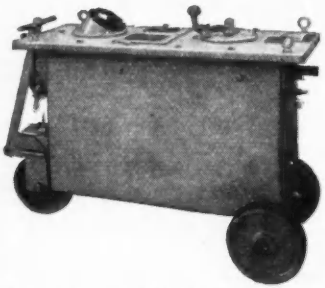
TODD BROS (ST. HELENS & WIDNES) LTD.
WIDNES LANCS

Telephones: St. Helens 3271 Widnes 2267.

dm 786

MUREX *ARC WELDING EQUIPMENT*

250 Ampere
PORTABLE SELF-CONTAINED
OIL-COOLED
TRANSFORMER UNIT



With output of 20 kVA, 15-250 amperes at 80 volts, or 15-200 amperes at 100 volts. Provided with oil-immersed tapped reactance coil which, in conjunction with a 12-point rotary switch allows for 36 adjustments over three current ranges. Complete with 4-in. flush pattern ammeter.

Stationary type transformers with separate regulators are also available for special requirements.

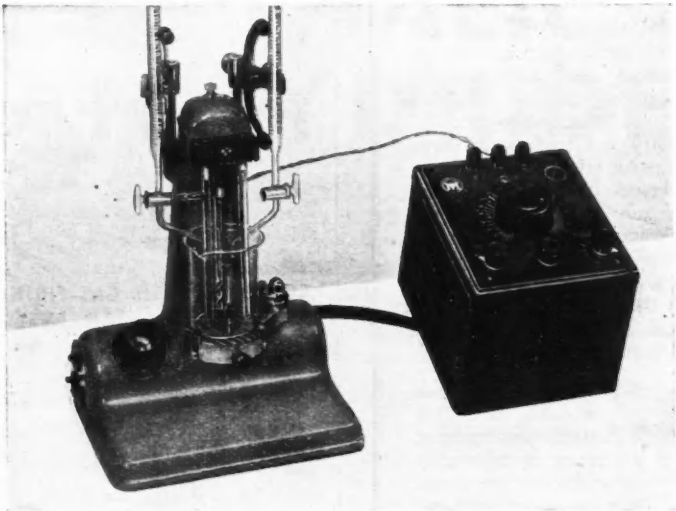
All that the unrivalled experience of Murex—pioneers of ARC Welding—can provide has been incorporated into these most modern of transformers. Sound design and fine workmanship throughout ensure long life and continuously satisfactory service under the most exacting of working conditions.

FOR ONE OPERATOR

MUREX WELDING PROCESSES LTD., WALTHAM CROSS, HERTS 'Phone: Waltham Cross 3636

MULLARD-B.T.L. POTENTIOMETRIC TITRATION APPARATUS

An entirely new instrument for potentiometric titrations, an outstanding feature of which is the incorporation of an electron beam indicator as an indicating device in place of a needle galvanometer.



The components are :

TITRATION UNIT comprises a heavy cast iron stand fitted with two burettes, electrode holders, automatic stirring, hot plate, and " Magic Eye " balance indicator.

POTENTIOMETER UNIT. A potentiometer operating from A.C. mains with a range of 0 to 1,600 mv., sensitive to 2 mv. Also provided with sensitivity switch, polarising current switch, and a cathode-ray tube indicator.

ELECTRODES. Five interchangeable electrodes, e.g., two platinum, and one each tungsten, calomel, and hydrogen, permitting the use of various electrode combinations.

The apparatus may be used for all types of oxidation-reduction and acid-alkali titrations, and in a limited manner for certain pH determinations.

Further details on request.

BAIRD & TATLOCK (LONDON) LTD.

14-17 ST. CROSS STREET, LONDON, E.C.1

At Your Service

With the fighting over the Bank looks forward to extending and adapting the range of banking facilities required for peace-time industry and trade. On large or small affairs, for home or overseas business, the Bank is ready to help forward the process of rapid reconversion. Besides current and deposit accounts it offers night safes for the trader, home safes for small savings, and all forms of personal banking service.

To each and every private citizen, no less than the largest business undertaking, over a century of experience is available through any one of the 1800 and more branches of the Bank. Men and women returning to civilian life, beginning a new business or extending an old one, whether they are customers of the Bank or not, are invited to call upon the Manager of their local branch and discuss their needs, in complete confidence. They will receive prompt and sympathetic attention at Britain's leading bank.

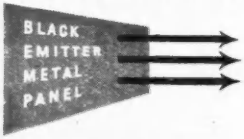
MIDLAND BANK
LIMITED

RADIANT HEAT

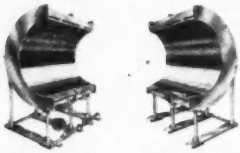
(infra-red)

DRYING

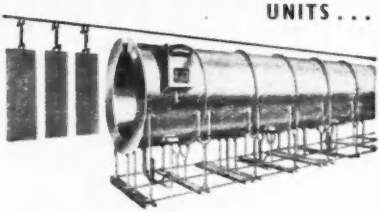
TAKE A SOURCE OF RADIANT HEAT . . .



USE IT IN A UNIT LIKE THIS . . .



EQUIP IT WITH GAS-FIRING AND ASSEMBLE TO FORM EXTENSIBLE UNITS . . .



AND YOU GET THE SIMPLE INFRA-RED DRYING TUNNEL

Robust, compact, inexpensive . . . easily constructed in different shapes and sizes without complicated auxiliary apparatus . . . giving even distribution of radiation and wide range of flux density at the turn of a tap . . . no material difference in drying time due to colour . . . low capital and fuel costs. Technical literature free on request.

FOR SIMPLICITY

the choice is **GAS**

BRITISH GAS COUNCIL
1 GROSVENOR PLACE · LONDON SW1

Removal of Control..

PHTHALIC ANHYDRIDE

Monsanto

take great pleasure in confirming that it is no longer necessary to obtain authority to purchase supplies of PHTHALIC ANHYDRIDE.

Another restriction to normal trading has been lifted, and we would like to discuss the implication with you, to see how we can best serve your future interests.

MONSANTO CHEMICALS LIMITED

Victoria Station House, London, S.W.1.

Telephone: Victoria 2255 Telegrams: Monsanto, Sowest, London
Cables: Monsanto London

CHLORAMINE

(Chloramine-T)

★

B.P. and COMMERCIAL

Enquiries should be made to the

Wholesale and Export Department

BOOTS PURE DRUG CO. LTD NOTTINGHAM

E068-805

PRINTED, PAINTED OR STOVE-ENAMELLED.

There's a BROUGH'S DRUM for every purpose

E·A·BROUGH & Co LTD LIVERPOOL AND SPEKE

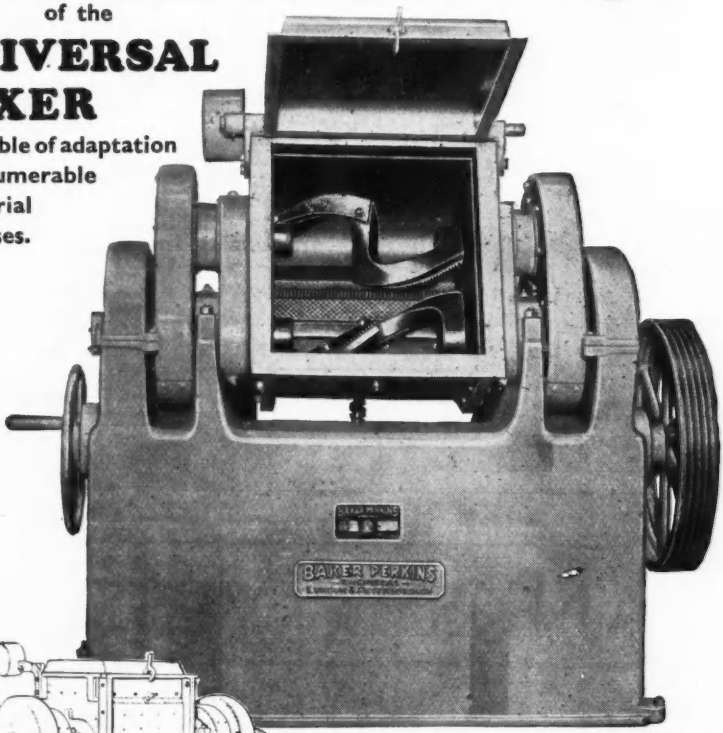
'PHONE ROYAL 3031-2-3 AND GARSTON 2217-8

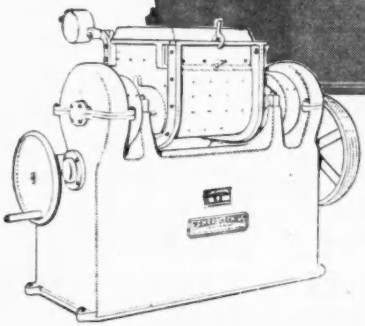
The Basic Principle

of the

UNIVERSAL MIXER

is capable of adaptation to innumerable industrial purposes.





Here, for instance, is a machine of 18 gallons capacity, with our Sigma type blades carrying adjustable, serrated edges, revolving in opposite directions against a saddlepiece likewise serrated, to obtain a shredding action simultaneously with thorough incorporation of the mix.

The jacketed trough is lined with renewable steel wearing plates.

BAKER PERKINS LTD

WESTWOOD WORKS — PETERBOROUGH

C

PRODUCTION PERSONNEL

Have you noted the extensive deliveries generally quoted ?
Does it remind you of conditions 6 years ago?

PREPARATION FOR A TOP-SPEED DRIVE

The OUTPUT you are planning **DEPENDS** entirely **ON** the reliability of your **PUMPS**

Remember **LABOUR PUMPS** are Rugged and Simple, with only one moving part.

Mechanical Failure is practically impossible

ALLOYS AND TYPES TO COVER THE ENTIRE INDUSTRY

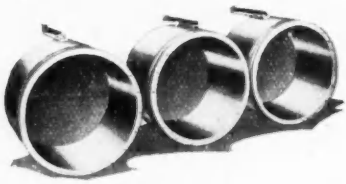
Corrosive — Hydraulic — Vacuum Extraction
Slurries — Aerated Solutions — Volatile Liquids

BRITISH LABOUR PUMP CO., LIMITED,

BLUNDELL STREET **LONDON, N.7.**
Telephone - NORTH 1663-4. *Telegrams* - Laboupump, London

TANKS & VESSELS

Stainless Steel
Aluminium
and other
Weldable Metals



MIXERS
PANS
Receivers
Dryers, etc.

London Office :
149-151, Abbey House
Victoria Street, S.W.1

Robert Jenkins & Co. LTD
IVANHOE WORKS ROTHERHAM
Estd. 1856

Also at
MANCHESTER
and CARDIFF

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON — Telephone: CENTRAL 3212 (12 lines)
GLASGOW: 116 Hope Street (Central 3970) — BIRMINGHAM: Daimler House, Paradise Street (Midland 0784-5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited

VOL. LIV
No. 1388. — February 2, 1946 — Annual Subscription 21s. Overseas 26s.

The Technical Press

OUT of our hard-won leisure time we took a busman's holiday the other night to attend a joint meeting of the Royal Institute of Chemistry, the British Association of Chemists, and the Association of Scientific Workers. There we heard a lecture by Dr. Ivanovszky and a discussion on the technical press. We were entertained by the discussion, but not edified. We came away, in fact, with the rather depressing feeling that the gulf between chemists and the technical press is great, and that the width of the gap is a measure of the lack of understanding, on the part of chemists, of the functions and characteristics of the technical press. If we endeavour to throw a little light upon this dark subject it is not with any intention of putting forward the claims of the technical press to special consideration, but purely to clear away some misconceptions which evidently exist.

The first of these appeared to be in regard to what the technical press comprises. Many seemed to confuse it with abstracts of scientific papers such as are produced by the British and American Chemical Societies and the Society of Chemical Industry. Others even confused it with the transactions of learned bodies. A well-known dictionary gives these definitions: *Scientific*, pertaining to science, its principles and methods; *Technical*, connected with, based on, pertaining to, the industrial or mechanical arts. Thus the technical press can by no stretch of the imagination be regarded as comprising journals devoted to pure science. It consists primarily of journals devoted to industry. Moreover, though the technical press may include in one and the same paper the functions of a trade paper and of a technical paper, the distinction must be drawn. A technical paper is concerned with the art, the word being used rather in its "patents" sense as meaning the application of science or technology to industry. A trade paper is primarily a commercial paper, carrying trade news and views with little attention to science or technology. The trade paper pure and simple is only to be found in industries that do not require any great application of science, or it may be devoted wholly to the selling problems of an industry, as in many papers that circulate among shopkeepers.

It is an undecided point whether a journal published by a technical society which is itself wholly a technical body without any pure science in its make-up is or is not a

On Other Pages

Notes and Comments 131
Constitution of Paludrine ... 132
Approval of Insecticides ... 132
Gaseous Fuels in Britain—II ... 135
Whither Industrial Research? ... 137
Wood Preservatives 138

METALLURGICAL SECTION

The Refining of Copper Residues 139
Steel Export Statistics ... 143
Metallurgical Education ... 144
Copper Development Association 144
Steel Trade Output Levy ... 144

German Technical Reports ... 145
Industrial Spectroscopy ... 145
Barytes from Eire 145
Personal Notes 146
Parliamentary Topics 146
General News from Week to Week 147
Commercial Intelligence ... 150
Stocks and Shares 150
British Chemical Prices ... 152

technical journal, and as such, part of the "technical press." Are the transactions of the Institution of Civil Engineers, or the proceedings of the Institution of Mechanical Engineers part of the "technical press"? On the dictionary definition of the word "technical" they are. We should say that by custom they are not. We shall therefore define the technical press, for the purpose of this discussion, as papers, not published by learned or technical bodies as comprising their transactions of proceedings, that are devoted to one or more specific industries, and that deal with the technical arts of those industries. We have no doubt that THE CHEMICAL AGE is a technical paper, though in so far as it gives market reports, prices, commercial intelligence, and company news it is also a trade paper.

The technical press, as here defined, has a definite rôle to play in industry. Those who are engaged on the purely scientific side of industry, a class of industrial worker which comprises, above all, the chemist, are not necessarily aware of the importance of this rôle. It is largely a matter of interpretation. The scientific man produces his report, which for form's sake he wraps up in scientific jargon. Even if this arouses ire in the breasts of our readers we repeat that much scientific language is a jargon intelligible only to those who use it (our dictionary defines *Jargon* as a set of highly technical terms used by students of a particular branch of learning—the fact that it also defines it as "gibberish" is neither here nor there!) Not only is the language difficult to understand, forming a stumbling block to those who are not highly versed in pure science, but the manner in which the matter is presented in scientific papers is generally dull except to the experts for whom it was written. The purpose of industrial research is to get knowledge that can be used. No knowledge can be used until it is understood by those who are to use it. Thus one important function of the technical press is to provide a medium whereby scientific work may be "popularised" to a sufficient extent to make the practical man aware of what has been discovered, and of its possible applications.

A second function of the technical press is to bring forward new developments that may not be suitable for the pages of the transactions of learned bodies. Learned bodies must always set their faces against any form of advertising. But in so doing they may rule out genuine advances in the art which, because they have been commercialised, are difficult to describe without some form of advertisement. Purely advertising write-ups are not published in the best technical papers, because such material should be issued by the firm concerned, either through paid advertisements or in separate booklets issued under the firm's name. But the dissemination of technical news of inventions, of new plant and processes, and of new works that are built comprising interesting technical features is an important function of the technical press.

The technical press is also a forum wherein matters of moment to the industry and the profession can be discussed in writing, anonymously if the need be, and without the necessity for attending meetings and giving "snap" views. One would not, for example, expect to find letters giving views of the salary scale of chemists, nor the education of laboratory assistants, nor the status that should be enjoyed by chemists, in the *Journal of the Chemical Society*, but such subjects are proper in the columns of THE CHEMICAL AGE. One part of that forum is the "leading article." The technical press has the great merit of being independent, and by reason of its independence can voice opinions that might not otherwise be heard. It is one thing for a man to say a thing in private to his friends; those in authority who should hear his views do not always do so. But the leading article can put forward views that may be unpalatable, and these views are often gathered from a wide canvass of opinion before they are thus published. The leading article has always been a feature of the daily press; it is none the less important in the technical press.

Through its advertisements and its articles, the technical press provides a shop window for the industry it serves. It shows what progress is being made and who is making it, and it gives a living picture of the industry as an organic functioning whole in a way that transactions of learned societies may not achieve. Every live industry has a strong trade and technical press behind it. Without such assistance the rate of progress in industry becomes slow, for industry cannot live by pure science alone.

NOTES AND COMMENTS

Indexing

WE have already commented on Dr. Ivanovszky's provocative paper on the technical press, and our leading article this week attempts to give some notion of our ideas on the functions of that body of the nation's reading-matter. There are one or two side issues arising from the subject, which are not altogether unworthy of further note. One of these is the question of indexing. Of this we would say two things at once: (i) indexing is an accomplishment which most people think they can easily master, but which few people properly understand; (ii) indexing, thoroughly done, is extravagant of both time and space. Bearing these facts in mind, it is quickly seen that Dr. Ivanovszky's recommendations are a counsel of perfection—and were, no doubt, intended as such. We quote from the official summary of his lecture: "Special indexes, patents, formulæ, new books, trade marks, new companies, should be introduced. Each issue of a journal should carry an elaborate subject index besides the other indexes. In addition to annual indexes, monthly and bi-annual, as well as quinquennial and decennial indexes, should become common practice. Subject indexes to the advertisement section of large-size journals would not only improve their value for immediate reference, but turn them into reference works of permanent value." To this we would say, as technical journalists: "Very well; give us the time, the staff, and the paper, and we will undertake to provide a fairly good showing on the lines demanded."

The Technical Advertisement

THE other side issue—if we may venture so to describe it—is advertising. Few people imagine, we suppose, that a trade or technical journal lives exclusively on its subscriptions; and so, if an industry requires a trade or technical press, it must support it by advertising therein. The reason for inserting an advertisement into a technical journal is not, primarily or necessarily, because one expects to sell an article as a direct result thereof. It is rather an indication of willingness and ability to serve the purposes of the industry concerned. Many advertisements, indeed, are conspicuous for their "news value"—the well-known I.C.I. series, for instance, depicting the varied types of personality employed in the chemical industry. Good advertising redounds to the credit of the industry as a whole, and its volume and quality are indicative of the healthy condition of the industry. The responsibility, however, is not one-sided; a reputable technical journal will not permit the insertion of advertisements which it considers unworthy of the industry it represents. If the technical and trade press is the "shop-window" of industry, it is to no one's advantage to display second-rate goods in that window. To appear in the advertisement pages of a sound trade journal is in the nature of a hall-mark; and it is good repute that sells most goods in the long run, not catch-penny dodges. With the chemical industry we feel that we are preaching to the converted; but now that the technical press is under the searchlight there is no part of it that should not be illuminated.

Behind the Coal Bill

AS was inevitable, the Bill for nationalising the coal industry has been found to have repercussions affecting industry far and wide. The possibilities involved were brought to light in a letter addressed last week by Mr. Robert Foot, chairman of the Mining Association of Great Britain, to the Minister of Fuel and Power, and informing Mr. Shinwell of the colliery owners' views on various important aspects of the proposals contained in the Bill. So far as concerns the chemical industry, the most important aspect is the fact that separate activities, carried out by colliery companies, which can be compulsorily acquired under the Bill, include coke ovens, gas works, patent fuel plants, tar distilleries, and chemical works. An M.P. put the matter to us in a nutshell the other day, pointing out that there are three classes of undertaking affected by the Bill: those which are to be nationalised at once; those which can be nationalised at the request of either party; and those which may be nationalised after arbitration. It would appear that the chemical works, etc., listed by Mr. Foot come into the second category; and, as he points out, their compulsory acquisition spreads the principle of public ownership far beyond the stated intention of

the Bill. Apart from anything else, their acquisition is going to complicate even further the already complex problem of compensation; and one is led on to ask, if this section of the chemical industry is to be nationalised, what about the rest of the industry? Advocates of nationalisation on the grand scale may view the answer to such a question with indifference, but we submit that in the first place there is no call for the nationalisation of the chemical industry, and secondly that if it must be nationalised, let the business be done straightforwardly, and not by indirect routes.

National Insurance

THE " cradle-to-grave " insurance proposals embodied in the National Insurance Bill which was presented to Parliament last week will affect every citizen in the land. In scope and in cost it out-Beveridges the Beveridge plan, and leaves far behind the gilded " ninepence for fourpence " of an earlier generation. The adult male worker is to pay 4s. 7d. per week and his employer 3s. 10d., and the scheme will be subsidised by the Exchequer—in other words, the taxpayers—to the extent of £175,000,000 in 1948, rising to £452,000,000 in 1978. Cost of benefits will exceed £450,000,000 in the first year and is estimated eventually to go up to £749,000,000. These are staggering figures: even so they may not represent the full commitments, for there are to be quinquennial reviews of benefit rates. There are many points on which more detailed information will be sought before general approval is given to the proposals—for instance the wide-open possibility of malingering through the stabilising of the maximum sickness benefit indefinitely; the power to raise or reduce contributions in accordance with the level of unemployment; the position of firms and employees with their own works' pension and benefit funds. The effect on production costs, too, is a matter which must engage thought. The scheme rests on the assumption of the nation's prosperity and on maintained low-level unemployment, yet in the light of the coal situation, the food and clothing position, and the grievous and discreditable absence of activity on the housing front, there is every reason for voices to be raised about the rush legislation of to-day, and the obvious neglect to put first things first.

Constitution of Paludrine

Formula Announced by I.C.I.

I.C.I. is now disclosing to the world the formula of Paludrine, the revolutionary anti-malarial drug discovered by I.C.I. scientists and announced in November last. Paludrine is N_1-*p*-chlorophenyl-N_5-*iso*propyl. biguanide, and is used in the form of a salt, for example the hydrochloride. Full details appear in the current issue of the *Annals of Tropical Medicine and Parasitology*.

A provisional process for manufacture has been worked out, and it is confidently expected that the cost of treatment by Paludrine will be appreciably below that by mepacrine, the synthetic anti-malarial drug used extensively during the war. Semi-scale manufacture is already going forward at Blackley, Manchester, and will be extended to Grangemouth, Scotland, where, during the war, I.C.I. erected a plant specially designed for manufacturing mepacrine. It is at Grangemouth that the final details of a process for full-scale manufacture of Paludrine will be hammered out.

Dr. F. H. S. Curd and Dr. F. L. Rose who, as members of the I.C.I. research team, first synthesised this new drug at Blackley, are to present a series of papers on the chemistry of synthetic anti-malarials at a meeting of the Chemical Society in London on February 7. The third member of the team, Dr. D. G. Davey, is just completing a tour of Australia and India where he has been consulting with the medical men who have actually been using Paludrine to treat a large number of malarial patients in those regions. When he returns, it is expected that he will bring fresh news of the practical application of Paludrine in the territories where it is most needed.

APPROVAL OF INSECTICIDES

The Ministry of Agriculture and Fisheries and the Department of Agriculture for Scotland are now prepared to receive applications for the official approval of proprietary Paris greens, derris-petroleum oil washes, thiocyanate-petroleum oil washes, sulphur products (sulphur dusts, flowers of sulphur, green sulphur, wettable sulphurs, dispersible sulphurs, colloidal sulphurs and sulphur preparations used for fumigation by burning), DDT insecticides (to be used as dusts and sprays), DDT-petroleum oil washes, benzene hexachloride insecticides (to be used as dusts and sprays) and benzene hexachloride-petroleum oil washes. Requests for the appropriate application forms should be sent to the Secretary for the Advisory Committee, Plant Pathology Laboratory, Milton Road, Harpenden, Herts.

Gaseous Fuels in Britain—II

Their Efficient Utilisation

by D. D. HOWAT, B.Sc., Ph.D., F.R.I.C., A.M.I.Chem.E.

(*Continued from* THE CHEMICAL AGE, *January* 26, 1946, *p.* 111)

FOR more adequate utilisation of blast-furnace gas provision should be made to utilise any surplus gas, after the requirements of the coke ovens have been met; or of the entire surplus, where local conditions render this procedure impracticable, for the generation of electric power. All the power generated should be absorbed by the Central Electricity Board "grid system," and utilised as far as possible for "base load" conditions. Again, a choice must be made between using the gas indirectly through boilers and turbo-generators or directly in gas engines coupled to generators. As an adequate market for all the power generated is provided by the "grid," it is highly desirable that all surplus gas be utilised to the best advantage. In such conditions the employment of gas engines provides definite advantages in thermal efficiency as compared with boilers and turbo-generators, in spite of the disadvantages of higher capital costs, greater weight, and larger floor-space requirements of the gas engines. According to Clements[4] the capital cost of a complete gas-engine installation is approximately 25 per cent. higher than that of equivalent boilers and turbo-generators for equal amounts of power generated. Depreciation on the extra capital outlay is more than compensated for by the greater thermal efficiency of the gas engines.

In Table 3 an attempt has been made to indicate the total output of electric power from blast-furnace gas after all the requirements of the blast furnaces have been satisfied, using the surplus values worked out in Table 2. Table 3 shows: (a) power output from the indirect use of blast furnace gas in boilers and turbo-generators; (b) power output from the direct use of gas in gas engines; and (c) power output from a combination of both methods of utilisation. In each set of conditions power output has been worked out when: (1) all the coke-oven requirements for oven-heating and steam-raising are supplied by blast-furnace gas; (2) when half of the total requirements of the coke-ovens only are supplied by blast-furnace gas; and (3) when all surplus blast-furness gas is used for power generation with no service at all to the coke ovens

Condition (1) is not possible in this country at the present time owing to the geographical location of the various plants, while condition (2) probably constitutes a rough estimate of the extent to which blast-furnace gas may be used as an alternative fuel for the coke ovens, provided that an alternative market is found for the coke-oven gas. A practicable measure that might be adopted would be to use the system generally favoured in this country, namely, steam boilers and turbo-blowers, for the supply of blast, but to complete the utilisation of the surplus gas by the installation of gas engines coupled to generators. Under such conditions the yield of power would be intermediate between that of the whole scheme of indirect utilisation and that of direct utilisation throughout in gas engines. It will be noted from the third section in Table 3 that, when supplying half the total requirements of the coke ovens throughout the country, and generating power from the residual surplus blast-furnace gas by the combination of methods indicated, a power output equal to that of the proposed Severn Barrage Scheme may be made available with considerably reduced capital expenditure.

Where geographical conditions preclude the utilisation of blast-furnace gas in coke ovens, the most obvious alternative fuel is

TABLE 3

ELECTRIC POWER PRODUCTION FROM SURPLUS BLAST-FURNACE GAS

Effect of different methods of utilisation and of varying percentages of absorption of supplies in coke ovens

Method of utilisation of gas at blast furnaces prior to further utilisation in coke ovens or for power generation	*Percentage of heating services at coke ovens supplied by blast-furnace gas*	*Heating value of gas supplied to coke ovens (million million B.Th.U.)*	*Heating value of surplus gas (million million B.Th.U.)*	*Power output possible from surplus gas (million kWh)*
Steam boilers and turbo-blowers followed by turbo-generators	100	70	10	250
	50	35	45	1125
	nil	nil	80	2000
Gas engines and gas blowers followed by gas engines and generators	100	70	20	1000
	50	35	55	2750
	nil	nil	90	4500
Steam boilers and turbo-blowers followed by gas engines and gas generators	100	70	10	450
	50	35	45	2025
	nil	nil	80	3600

producer gas. If the provisional estimate that about half the heating requirements of the coke ovens may be provided by blast-furnace gas is approximately correct, then about 1½ million tons of coal must be treated in producers to provide a gas supply with the necessary heat value of about 35 million million B.Th.U. Provision of alternative fuel in the form of producer gas is highly attractive from the point of view of fuel efficiency. Provision of this alternative fuel supply will release about 75,000 million cu. ft. of coke-oven gas for general domestic and industrial purposes. This total of gaseous fuel may be made available by the expenditure of 1½ million tons of coal for the manufacture of producer gas, but to provide the equivalent volume of town gas would involve the treatment of about 4½ million tons of coal. The increase in fuel efficiency is therefore extremely significant.

According to the calculations indicated, it should be possible to make available about 150 million cu. ft. of coke-oven gas for general domestic and industrial use. Half of this quantity will be provided by using 1½ million tons of coal for the manufacture of producer gas. The other half is made available by utilising surplus blast-furnace gas for coke-oven heating and steam-raising requirements. In addition, sufficient blast-furnace gas remains to generate 1000 to 2000 million kWh of electric power, according to the method of utilisation.

Two main markets exist to absorb this large volume of coke-oven gas: first, the general domestic and industrial market; and second, the almost completely new market for the provision of chemical raw materials. In actual fact sale of coke-oven gas to town-gas undertakings has increased steadily from 6.6 million therms in 1921 to 146 million therms in 1938. Those gas undertakings obtaining a high proportion of their gas from coke ovens are indicated in Table 4.

TABLE 4

Gas undertakings in Britain obtaining a high proportion of gas from coke-oven plants

Gas undertaking	*Quantity of coke-oven gas taken (1938) (million therms)*	*Total quantity of gas supplied (1938) (million therms)*
Sheffield	52.6	53.3
Newcastle-on-Tyne ...	22.4	36.2
Stoke	8.0	14.7
Derby	7.2	9.8
Middlesborough ...	6.1	6.7
Rotherham	5.4	8.1

A notable feature of the war years was the steady increase in the sale of coke-oven gas to town-gas undertakings, as indicated in Table 5. The latest figures show that coke-oven gas is bought by 53 gas undertakings from 54 coke-oven plants. At a rough estimate, sale of coke-oven gas to statutory undertakings increased from about 14 per cent. of the total make in 1938 to over 21 per cent. in 1943. In considering the future absorption of coke-oven gas by the statutory undertakings, the difficulties must be remembered. The most serious of these are fluctuations in the supplies due to fluctuations in the iron and steel trade.

After careful consideration of all the relevant factors the Heyworth Committee estimate a 20 per cent. increase in the total sales of town gas in ten years' time. It may reasonably be asked whether this increase might not most usefully be provided by an increased absorption of coke-oven gas. A 20 per cent. increase in the total gas sales for 1943 amounts practically to 75,000 million cu. ft. or about half the total quantity of coke-oven gas that might be made available under the schemes suggested. At the same time a very strong case might be made for the utilisation of the remaining half of the surplus coke-oven gas as a source of chemical raw materials. Such a volume (75,000 million cu. ft.) of coke-oven gas is capable of yielding some 70,000 tons of ethylene, 350,000 tons of methane, and 90,000 tons of hydrogen.

The Significance of Methane

The rapid progress in the production of acetylene by the pyrolysis of methane in the U.S.A. during the war has given greatly increased significance to the possession of ample supplies of methane. Until 1939, supplies of acetylene in this country were dependent entirely on imports of calcium carbide from Norway, Sweden, Canada, and the U.S.A. While a calcium carbide industry has been established in this country its continuance in its present location is seriously menaced unless cheap hydroelectric power is made available. At a reasonable estimate about 170,000 tons of acetylene may be produced from the 350,000 tons of methane obtainable from the coke-oven gas fraction, whereas 500,000 tons of calcium carbide will be required to produce an equal quantity of acetylene. While the pyrolysis of methane does not involve the expenditure of large quantities of electric power, 1650 million kWh would be necessary to smelt the half million tons of calcium carbide.

TABLE 5

Total Sales of Coke-Oven Gas to Gas Undertakings

Year	*Total gas bought from coke-ovens (million cu. ft.)*	*Per cent increase in sales of coke-oven gas on 1938*	*Per cent. of coke-oven gas in total gas available*
1938	29,621	—	8.52
1939	33,109	12.1	9.45
1940	36,765	24.1	10.75
1941	41,582	40.4	11.25
1942	46,880	58.2	12.20
1943	46,992	58.6	11.80

Acetylene is a key raw material in plastics for the production of all the vinyl compounds, and in the rayon industry for the production of acetic acid and anhydride, used largely in the cellulose acetate process. Obviously, urgent action is called for in the

chemical industry of this country to exploit the gases derived from our most important raw material—coal—as sources of acetylene.

Such considerations prompt the query as to whether all possible sources of methane have been tapped in this country. Here, again, progress on the Continent has been much more rapid than in this country. In Germany large volumes of methane have been obtained from sewage plants, one such plant, located at Munich, producing 100 million cu. ft. of gas annually for addition to the town gas plants. Recovery of methane from coal seams has also been exploited in Germany and the U.S.A. Removal of methane (fire-damp) from coal seams is essential for safety purposes, although it is believed that regulations governing the fire-damp content often hinder the adoption of improvements, *e.g.*, in lighting—which might greatly benefit the output of coal. Therefore, if suitable means can be provided for the collection of methane, the adoption of such measures may assist considerably in facilitating coal production in addition to recovering a valuable gaseous fuel. In one suggested scheme[7] a compressed-air-operated ejector was employed to withdraw the gas from the roof of the seam, the mixture being afterwards diluted by the ventilating air current until the methane content fell below the maximum specified legal limit of 2½ per cent.

Methane Recovery

According to a recent American report[8] supplies of gas have been obtained during the past 40 years in South-Eastern Ohio by drilling vertical boreholes about 1 ft. into the coal seam lying about 400 ft. beneath the surface. Many such boreholes produce up to 10,000 cu. ft. per day even after 30 years' operation. This report,[8] while instancing these facts, suggests that large-scale recovery of methane from these American seams may best be secured by horizontal boreholes drilled in the coal seam. Overall cost of methane production from these horizontal boreholes in a gassy seam is estimated at about 5 cents per 1000 cu. ft. A recovery of 50 million cu. ft. would meet the capital cost of each well and thereafter the operating cost would fall to about 2½ cents per 1000 cu. ft.

An interesting report from a German colliery[9] gives some details of the recovery of methane from a newly-opened coal seam in the Ruhr. During the year April, 1943-March, 1944, a total of 175 million cu. ft. of gas was pumped from this mine to the Ruhr gas grid. Selling price of the gas was *Rpf.* 1.1 per cu. m. (about 6d. per 1000 cu. ft. of gas with a calorific value of 475 B.Th.U. per cu. ft.), yielding a monthly revenue of *RM.* 6600 against a total operating cost of *RM.* 1800.

Graham[10] advocated the employment in British mines of horizontal boreholes in a heading driven some distance in advance of the centre of a long-wall face. In gassy seams it would appear to be economic to pipe the gas direct to the surface through vertical boreholes driven down at intervals as the coal face advances. Graham quotes varying outputs of methane from experimental boreholes in this country, stating that the quantity of gas given off from points a short distance back from the face may, in a very gassy seam, amount to over 700 cu. ft. per min. for a 200-yd. length of coal face. He further estimates that the loss of methane incurred during mining in Britain is of the order of 70,000 million cu. ft. annually. If these figures are even approximately correct then a nationalised mining industry must address itself in the very near future to devising methods of recovering this valuable gas. Even considered as a fuel supply this loss of methane is equivalent to the calorific value of 3 to 4 million tons of coal, but the loss of a rich potential source of acetylene is an even graver offence. Speeding up coal production by reducing the hazards of fire-damp may also be expected as an immensely practical benefit following the adoption of methods of methane recovery.

Gas-Grid Systems

No method of really efficient utilisation of the gaseous fuel supplies available in this country is possible without the establishment of a gas-grid system, or at least regional gas-grid systems. The only regional grid of any significance established in this country at the present time is that operated by the West Yorkshire Gas Distribution Co. According to the Heyworth report,[4] "this company was formed to co-ordinate gas supplies in West Yorkshire through the construction of a gas grid to collect gas from coke ovens and to supply such gas to local undertakings for local distribution. This scheme has resulted in substantial economies in production and distribution and has, generally speaking, enabled the undertakings supplied by it to secure important increases in sales, including industrial sales."

A similar scheme is advocated by the Coal Processing Industries Panel[5] for the North-East district. Here nine major batteries of coke ovens are already supplying crude surplus gas to ten gas undertakings, some 65 miles of crude gas mains having been installed. At present the quantities of gas involved in the public supply of the area are 9500 million cu. ft. of coke-oven gas and 7000 million cu. ft. of town gas annually. A further 11,000 million cu. ft. of coke-oven gas are being utilised in this district for "low-grade purposes," *e.g.*, steam generation, and it is proposed that this volume should be drawn upon to complete the supplies to the proposed grid. Installation of about 42 miles of crude gas

mains would be necessary and a further 70 miles of purified gas mains, the total cost, including auxiliary plant, being estimated at £600,000.

Nothing new or untried is involved in the establishment of gas grids, long-distance transmission of coke-oven gas having been successfully carried out for years before the war in Germany, Holland, Belgium, and the U.S.S.R. In the U.S.A. distribution of natural gas to consuming centres hundreds of miles from the production point has been effected on a very large scale. The establishment of a grid system efficiently controlled and operated would go far to remove the greatest objection raised to the purchase of bulk supplies of coke-oven gas by the statutory undertakings—namely, fluctuations or interruptions in the supply.

Old-Fashioned Gas Transmission

So far as gas transmission is concerned, decided improvements are essential in this country and the findings of the Heyworth Committee on this point are of interest: "The evidence placed before us suggests that in many instances transmission techniques has not kept pace with carbonising technique and that substantial economies in this element of cost are still possible by a modernisation of existing systems. Modern methods of high-pressure transmission have increased the range over which gas may be distributed at an economic price from a central station, and one or two striking examples of its application have shown the advantages to be derived from well-planned grids. Owing to the limited progress of integration it has been impossible to carry out any widespread reconstruction and there are few systems to-day which reflect the benefits to be derived from modern distribution technique. Amalgamation and integration should give the necessary opportunity for bringing distribution systems up to date. The linking of undertakings, and the planning of new grids and networks which it entails, will require high and medium pressure transmission, systems of supply-pressure control and high-pressure storage. The effect should be economies in stand-by plant and storage capacity and a better over-all service to consumers."

While the establishment of regional gas grids is not specifically named among the recommendations of the Heyworth Committee it is clear from the whole tenor of the report that such developments are an integral part of the scheme visualised. Further, it is important to point out that the absorption of coke-oven gas for general domestic and industrial sales will be greatly facilitated by the adoption of such proposals. Large supplies of coke-oven gas are available in the following among the proposed "regions" to be administered by the "regional boards": Scottish, Northern, North-Eastern, Midland, and Western.

Some Necessary Adjustments

As a further step towards the integration of the whole gas industry in this country the Act of Parliament implementing the proposals of the Heyworth Committee might extend to the regional boards powers to acquire, at an economic price, any bulk supplies of coke-oven gas available in the region. Adjustments would undoubtedly be necessary, particularly in integrated iron and steel plants where supplies of coke-oven gas form an essential element of the total fuel supply. In such cases replacement of coke-oven gas as a fuel would render necessary the introduction of additional producer-gas plant for which suitable financial adjustments would be required. If coke-oven gas is released for general use as a fuel of high calorific value, then a distinct gain in coal-utilisation efficiency results from its replacement for such purpose as coke-oven heating and furnace heating by a cheaper alternative fuel such as producer gas.

While the establishment of regional gas grids will further the fuller and more adequate utilisation of the gaseous fuels available in Britain, it may be suggested that maximum utilisation will depend upon the establishment of a national grid. On this point it is rather disconcerting to find that, after arguing the merits of regional grids, the Heyworth report dismisses the feasibility of a national grid, stating that "while grids operate beneficially in helping to balance the loads of undertakings and in enabling economies to be effected in stand-by plant and storage capacity, we are of opinion that in view of the present size of the industry and of the distribution of the areas of high demand, a national grid could not be justified on technical or economic grounds." The example of the Ruhr and Belgian grids for long-distance transmission of coke-oven gas is rejected on the grounds that the conditions obtaining in these districts are in no way comparable with those in any area of equal size in Britain. While it must be admitted that in both these instances the areas served by the grids were densely populated and combined a large number of industrial consumers with a potentially large domestic demand, the outstanding success of these schemes remains a continual challenge to the gas industry in this country.

The Chemical Industry's Concern

So far as the British chemical industry is concerned, the great problem of the immediate future is the fullest utilisation of all sources of raw materials capable of being employed in the new synthetic industries. In the absence of indigenous supplies of oil,

raw materials for these new industries must be obtained in large measure from coal. Carbonisation gases, particularly town gas and coke-oven gas, constitute really large-scale sources of such important raw materials as ethylene, methane, and hydrogen. While the preponderant utilisation of these gases as fuels will probably continue, other methods of utilisation must be developed. Adequately implemented, the proposals of the Heyworth Committee should facilitate and expand the use of these gases by the chemical industry as sources of raw materials.

REFERENCES

[1] *The Gas Industry: Report of the Committee of Inquiry.* (Cmd. 6699. Dec., 1945.)
[2] *Symposium on Steelmaking* (Iron and Steel Inst., 1938. Spec. Rep. No. 22).
[3] *Statistical Digest* (Cmd. 6538. July, 1944).
[4] CLEMENTS, *Blast Furnace Practice*, Vols. I, II, and III (1930).
[5] Coal Processing Industries Panel: *First and Second Reports.* (Northern Industrial Group, Pub. No. 3. Oct., 1945).
[6] NAPIER, *Ammonia Synthesis from Coke-Oven Gas* (*Inst. Chem. Eng.* Feb., 1945).
[7] GASKELL, *Trans. Inst. Mech. Eng.*, 1934-35, *88*, 339.
[8] RANNEY, Paper published in Eng. Experiment Station News, Ohio State University.
[9] *Ind. Chemist*, 1945, *21*, 256.
[10] GRAHAM, *B.C.U.R.A. Monthly Bull.*, 1944, *8*, No. 5, 133.

Whither Industrial Research?

Forecast of U.S. Expenditure

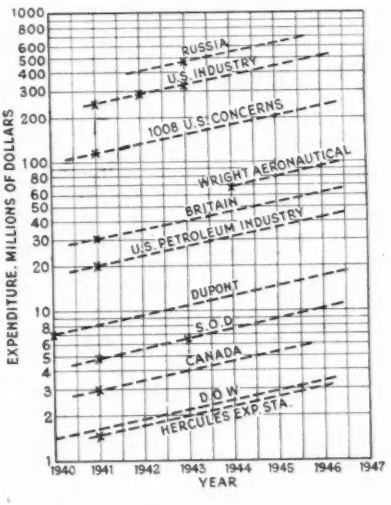
IN an interesting review of the future of industrial research, Mr. Peter J. Gaylor[1] (*see* THE CHEMICAL AGE of December 30, 1944, p. 611) presents facts and figures about industrial research expenditure in the United States, as well as a comparison of the amounts spent in this country, the Soviet Union and Canada. He concludes his article, which is abridged herewith, by stating that "research will continue to grow at a logarithmic rate."

In practically every instance examined, figures show that research expenditure of the various industrial firms, institutions and governmental establishments has been on the upgrade. From data in the literature[2] it is possible to predict (by extrapolation) roughly the rate of growth in this direction and, as may be seen from the graph, the trend appears to be a doubling of research expenditure every five years.

The war has not slowed up research work. It merely deflected its course temporarily, but this has not made the results useless for peace-time industrial progress. In fact, the National Research Council[3] stated that the larger laboratories are expecting to employ three times as many scientists as they did in the pre-war period.

Figures for 1946

By referring to the graph (which is based on pre-war statistics), we find that, by 1946, the country's industries would be spending in the neighbourhood of $500,000,000 for research. Du Pont would be spending around $16,000,000, while the Standard Oil Development Co. would spend around $10,000,000. The petroleum industry would be expected to spend over $40,000,000 for research, which has been called a "luxury" in the not too distant past. Like the automobile, research has moved from the luxury class to the category of a necessity. One survey has shown that research workers will make up 10 per cent. of the petroleum refining industry's personnel in 1950, if the current trend continues.[4] On the basis of extrapolation of previous expenditures,[5] International Nickel can be expected to spend, in 1948, about five times the amount it spent for research in 1928.



A fair picture of where the research money (and effort) was spent in the past by the petroleum industry has been deduced from publications and patents by Winning.[6] He found that of the literature articles during 1934-6, 17 per cent. were on motors and motor fuels, 14 per cent. on lubricants and lubrication, 13 per cent. on cracking and isomerisation, 9 per cent. on kerosene

and diesel fuels, 8 per cent. each on the subjects: asphalt, refining of lubricants, 7 per cent. on fuel refining, and 6 per cent. on distillation and absorption. Of the patents issued during 1929-35, 32 per cent. were on refining and polymerisation, 15 per cent. on cracking, 11 per cent. each on production and specialties, 9 per cent. on hydrogenation, 12 per cent. on chemicals, 6 per cent. on lubricants, and 4 per cent. on fuel oils.

As stated previously, this is based on pre-war figures and does not take into consideration the impetus of the enormous amount of research initiated by the Government for war purposes. One interesting and thought-provoking situation apparent from the graph is the position of the various countries on the chart. Although Russia is spending about the same amount per head for research as the U.S., due to its larger population, it is actually spending 50 per cent. more. The comparative figures[7] of the various expenditures are as follows:

Country	Expenditure per head	Per cent. of national income
Russia	$1.80–$3.00	1
United States ...	$2.40	0.3
Britain	$0.70	0.1
Canada	$0.22–$0.29	—

Another line of thought, leading to the same conclusion, is based on patent statistics. The outsider, of course, does not have access to the amount of creative work done by the various concerns in the U.S. The only reasonable criterion to him is the number of patents issued to the personnel.

Using this as a basis, a survey[8] has been made, listing the companies which have been active according to the above definition. It shows that 14 companies, including five chemical companies and the Standard Oil Development Co., obtained 100 patents a year; 32 companies obtained 30-100 patents a year, while 120 obtained annually between 10 and 30 patents.

Thomas's Register (1944) lists some 25,000 manufacturers of whom more than 1700 have capitalisations of over $10,000,000, more than 5000 of over $1,000,000, and more than 10,000 of over $100,000. Now, to obtain 10 patents per year does not require an expensive creative staff. Yet, the remarkable fact brought out by this survey is that of the thousands of manufacturing institutions and businesses in the U.S.A., only 166, or less than 1 per cent., show activity within this range, and of these, 75 per cent. are only mildly active. In other words, all but less than 1 per cent. of the manufacturing concerns in the United States are living a hand-to-mouth existence from the technical point of view. To protect themselves from their more aggressive competitors, some of them have been complaining to the Government about the evils of the patent system. In the end, of course, this will not settle their problem, for it will either eliminate technical progress in this country in favour of other more progressive nations, or it will force the Government to do their research and development—a step toward socialism which they resent even more. The ultimate solution, obviously, lies in "jumping on the bandwagon," and already many of those who do not feel able to cope with the problem alone have formed research pools[9] from which they have benefited appreciably.

REFERENCES

1 *Nat. Petrol. News, Techn. Sect.*, October 3, 1945.
2 *Chem. Eng. News*, October 2, 1942, p. 221, August 25, 1942, p. 1061; *N. Y. J. Comm.*, October 6, 1941; *Petrol. Times*, August 5, 1944, p. 495; *Wall St. J.*, May 15, 1942, p. 8; *C.T.J.*, May 7, 1943, p. 427; *N.Y World Teleg.*, October 9, 1944.
3 *Time*, May 7, 1945, p. 56.
4 *Oil & Gas J.*, July 3, 1941, p. 1..
5 WADHAMS, *Chem. and Met. Eng.*, 1938, 45, 613.
6 WINNING, *World, Petrol.*, October, 1936, p. 466.
7 MACKENZIE, *Chem. Ind.*, June, 1944, p. 828; HARTLEY, *Ind. Bull.*, (A. D. Little, Inc.), February, 1944.
8 *The Technical Survey*, 1945, p. 8.
9 *Wall St. J.*, December 12 and 27, 1944.

Wood Preservatives

British Standard Classification

A BRITISH Standard Classification of Wood Preservatives, B.S.1282, has just been issued, a committee of the Institution having had under consideration the preparation of a British Standard for Wood Preservatives based on laboratory performance tests. It has not yet been found possible to devise acceptable tests to assess penetrating power and permanence and the preparation of such a specification has been abandoned for the time being.

In view of the post-war building programme, a largely increasing demand for wood preservatives is likely to arise from users with little experience of their suitability, properties and methods of application. The classification, which defines the main types of wood preservatives and includes notes dealing with their application and use, is issued as an interim measure for the guidance of such users. Copies may be obtained from the Institution, 28 Victoria Street, London, S.W.1, price 2s.

A recent leaflet issued by FOUNDRY SERVICES, LTD., Long Acre, Birmingham, 7, lists the latest additions to, or improvements of, the "Foseco" range of preparations. They include "Cuprex" blocks (8 oz. or 16 oz.), which remain at the bottom of the crucible during melting, acting as an effective degasser. No. 1 is for gunmetal, copper and nickel alloys; "Cuprex" No. 2 for phosphor Bronzes.

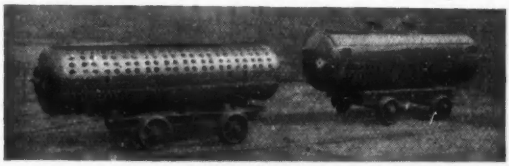
"Feedol" is described as an efficient compound for the self-feeding of risers, in the casting of non-ferrous alloys.

Metallurgical Section

Published the first Saturday in the month

Clayton, Son & Co., Ltd.

MOORE END, HUNSLET, LEEDS, 10 Telephone: Hunslet 75226-9
Telegrams: Gas, Leeds

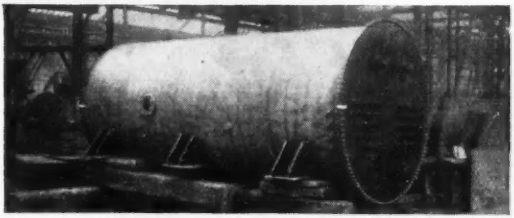


Drums for Water Tube Boiler

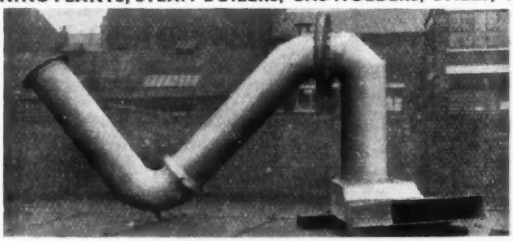
o

Sludge Heater for Sewage Treatment

o



CHEMICAL PLANT, PLATE WORK OF EVERY DESCRIPTION, TANKS, OIL REFINING PLANTS, STEAM BOILERS, GAS-HOLDERS, STILLS, WELDING SPECIALISTS

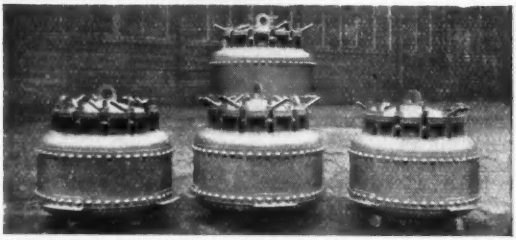


Large Diameter Welded Pipes for Chemical Works

o

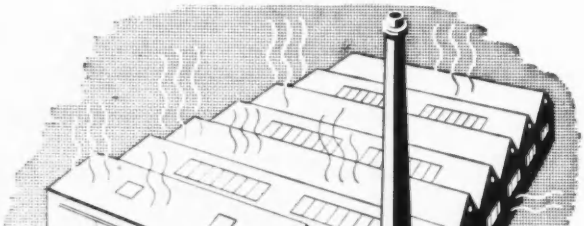
Group of Mild Steel Pressure Filters

o



LONDON OFFICE:
ABBEY HOUSE, 2 VICTORIA STREET, S.W.1

ASHTEAD 502
Telephone: Abbey 1754



Don't let that heat escape!

VERY VALUABLE WORK has already been done to insulate pipes and tanks by lagging, but it is probable that insufficient attention is still given in Works and Factories to the efficient insulation of whole buildings.

Specialist advice on this vital question is available in the Fuel Efficiency Bulletin NO. 12, "THERMAL INSULATION OF BUILDINGS," obtainable from your Regional Office of the Ministry of Fuel and Power.

POINTS TO REMEMBER ABOUT HEATING

1 Once a building has been heated up to the necessary temperature, fuel is only needed to *maintain* that temperature.

2 The speed at which a building cools (due to the escape of heat by various means) governs the amount of fuel which is required to replace the escaping heat and maintain the temperature.

3 Adequate insulation reduces the heat loss and, hence, less fuel is required to maintain the temperature. And, remember, the building will be cooler in summer.

Remember . . .
effective insulation cuts fuel consumption

ISSUED BY THE MINISTRY OF FUEL AND POWER

Metallurgical Section

February 2, 1946

The Refining of Copper Residues

A Survey of Theory and Practice

by O. P. EINERL, Dr.Eng., and FREDERIC NEURATH, Ph.D.

THE working up of copper residues of various kinds involves processes of which the principles are well established, though many of them are only partly metallurgical. The procedure in its first stages is rather a mechanical-technical problem, combined with commercial considerations, requiring more planning than most other metal manufacturing processes. An outline of these problems has been published by Miller (General Economic Considerations Governing the Utilisation of Secondary Copper Base Materials).[1]

The technical problems arising with residues are connected with the possibility (a) of separation at source; and (b) of segregating the contaminated residues in the recovery plant.

Commercial Problems

The corresponding commercial problems are: (a) to have a properly working evaluation scheme for all kinds of residues to be purchased; (b) to have sufficient capital to maintain large stocks of raw materials and intermediate products, of which there are very many kinds. It is necessary to allow each to accumulate until there is enough to make treatment worth while.

(c) As it is a peculiarity of scrap that it fetches more when sold wholesale than when sold in small lots, it is a question how far it pays a refiner to do his own collecting of materials from the various producers. He saves the metal merchant's profits, but introduces into his refining business a troublesome and expensive department, requiring highly experienced staff.

(d) The importance of personnel in any reclamation effort cannot be overemphasised. Careful classification, assisted by a quickly working laboratory, and sorting by trained and experienced metal sorters, combined with intelligent supervision, form the backbone of a copper residue-reclaiming plant. The matter has been discussed by the London Section of the Institute of Metals.[2]

(e) In the case of mixed metal residues the question often arises—does it pay best to smelt for an alloy or to separate the mixture into its component parts? The answer is to be found in the relative demand for the various products possible. It is obviously easier and less costly to smelt a tin-containing copper-base dross for a gunmetal than to separate the copper from the tin, but if there is no demand for gunmetal, or, if the alloys which result from the refining process contain too many harmful impurities which can neither be removed nor "diluted" by blending, the refiner is compelled to separate the copper from the accompanying metals. Again, much tin-containing copper residues might conceivably be smelted with brass residues from a rolling mill, or with lead-free, aluminium-containing, or partly ferrous material for a secondary manganese bronze, etc. Unfortunately, most white-metal-containing residues are also antimony-containing, and an excess of 0.2-0.3 per cent. Sb is harmful not only to gunmetal but also to cartridge brass.[3]

Sources of Supply

The types of commercial copper residues are as follows (*see* also Einerl and Neurath, The Cycle of Non-Ferrous Metals)[4]:

(a) Residues from the manufacture of copper, brass, gunmetal, manganese bronze, and phosphor bronze in metal works or foundries, of extremely varied nature and of all degrees of richness, in the form of ashes, skimmings, dross, splashings, spillings; and possibly comprising foreign matter such as clinker, furnace and ordinary bricks, old graphite or carborundum crucibles, slags, foundry sand—and therefore often highly siliceous.

(b) Brass sweeps, etc., from fettling and trimming shops, filings and grindings mixed with foundry sand, iron wire, etc.

(c) Used sand from moulding benches and moulding machines or discarded sand from the sand sifters, containing 1-3 per cent. Cu. These are exceedingly poor residues, which are nevertheless recovered in times of high market prices. Methods have been described by Arend.[5]

(d) Lead and brass scrap mixed with white metal and gunmetal borings, containing also sometimes borings from cast iron. Methods employed have also been described by Arend.[6]

(e) Other contaminated copper-base

alloys, too impure to be used for conversion into ordinary alloys by remelting and blending, *e.g.*, bushy steel turnings mixed with brass borings or turnings, clad steel scrap, etc. The last is an important item, and a paper by Craig "Recovery of Copper from Clad Steel Scrap" was read before the American Secondary Metal Symposium.[7]

(f) Dross consisting of solder and metal filings from automobile bodies, silver-cadmium-copper solders to B.S.S. 206, residues from the brazing of steel or Monel metal turbine blades and subsequent machining of these, coppersmiths' waste, etc.

(g) Copper scale from rolling mills, hammer mills, etc., sometimes iron-free, with over 80 per cent. Cu, sometimes contaminated with iron scale, sand, etc., and having a considerably lower Cu content.

(h) Buffings, grindings, polishing waste from brass finishers, engineers, ship-propeller manufacturers (mostly manganese bronze, but also comprising gunmetal and aluminium bronze) and other metal workers, containing large amounts of emery, and therefore Si and C, when carborundum grinding wheels are used. Methods of recovery have been described by Arend.[8]

(i) Cyanide waste from electroplaters.

(k) Copper sulphate residues from textile works. A method developed by Norddeutsche Affinerie, Hamburg,[9] introduces ethylene at 6 atm. and 40°C. into an acid solution of copper sulphate in the presence

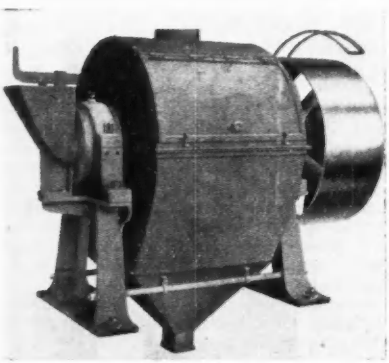


Fig. 1. Ball cinder mill.

of metallic copper, leading to the solution and reprecipitation of metallic copper.

(l) Cement copper (from chemical factories) precipitated from copper-containing neutral or neutralised solutions, with the addition of mild steel scrap. For example, pyrites used in sulphuric acid manufacture when roasted gives up SO_2, while the copper-containing residue is treated with HCl to convert CuO and Fe_2O_3 into soluble copper chloride and iron chloride. From this solution the copper alone is cemented as a fine powder after inserting iron scrap.

(m) Type copper shells—the copper part of electrotypes from which the lead has been melted off. They hold about 50 per cent. Cu, 45 per cent. Pb, 5 per cent. Sn+Sb. The re-use of such materials is described by the Advisory Committee on Metals for the American War Production Board.[10]

(n) Skimmings of lead bronze to specification DTD 229 from the manufacture of high-duty aircraft and other crankshaft bearings, containing lead up to one-third of the copper content, and iron-leaded bronze borings. Special methods have been described by Klare.[11]

(o) Skimmings and dross from silicon bronzes, *e.g.*, Tungum, P.M.G. metal, and other alloys to specification DTD 355.

Partial Refining and Pretreatment

The principles which underlie work under the above headings are: (1) that a metal even full of impurities is worth more per unit in the form of ingots than as ashes, drosses and residues or mixed loose scrap; (2) that the value of a parcel of mixed scrap or residues often goes up enormously by its separation into two metallic constituents (each of which might still contain part of the other) or into a mainly *metallic* constituent, rich in copper, and a *non-metallic* constituent, poor in copper; (3) that the refiner can pay more per cent. of copper content in copper residues the higher the copper content is; (4) that low-melting constituents of a mixture of scrap or residues should always first be removed by liquating in a liquating furnace, in a pot, or by heating up on a resisting screen, where liquid lead or white metal is allowed to sweat out, or by crushing and sieving a mixture of brass dross and ashes to obtain metallics which can be melted into ingots; (5) that magnetic separation is employed wherever possible before melting. (*See* Manegold in *Iron Age*, reprinted in *Metal Industry*)[12]; (6) that water concentration should be employed wherever possible. Separation is here effected by the difference in the specific gravity of the metallic and non-metallic content of the source material. An abridged description of the concentrating tables used by the Westinghouse Company (from *Iron Age*) has been published in *Metal Industry*.[13]

In the Wilfley residues-reclaiming plant (Figs. 2, 3, 4), the material is charged into a belt conveyor and raised and emptied into a ball mill. Slag and other lumps are there reduced in size and some separation is performed as the crushing of the lumps releases some of the metal embedded in the larger lumps of slag. The crushed material leaves the ball mill, passes a screen, which separates it into coarse and fine material.

The coarse material, with about 70-75 per cent. metal content, proceeds to the refining furnace, while the fine material proceeds to the concentrating table. This table has an eccentric motion with a stream of water playing across its face. The movement of the table together with the stream of water gives rise to differential behaviour of the various components of the material in accordance with their specific gravity. The lighter materials are enabled to hurdle the riffles progressively, while the heavier materials (sand and other solid metallics), being unable to cross the table, are washed down the length of the riffles by the water.

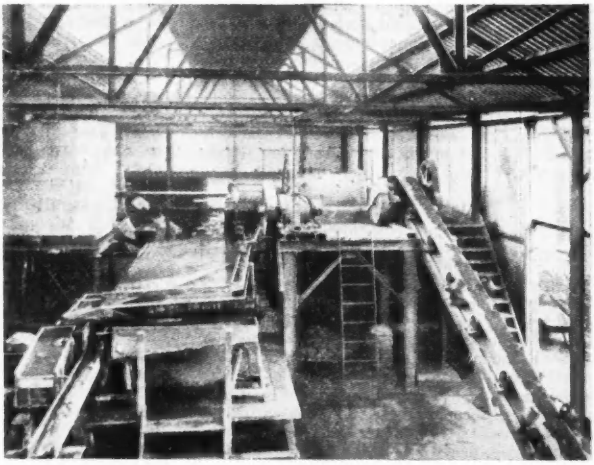
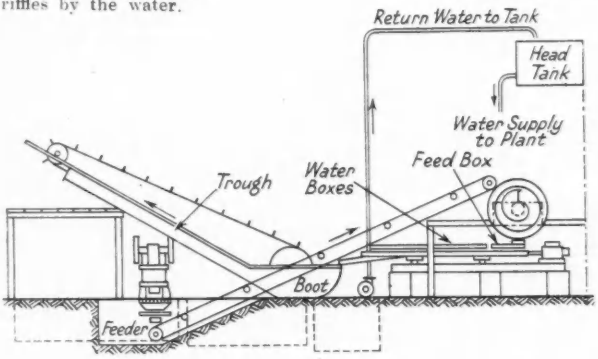
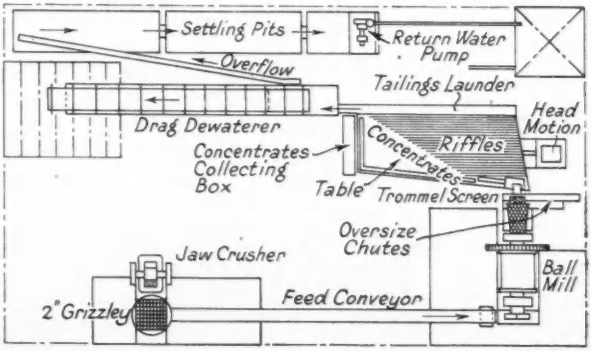


Fig. 2. Residues-reclaiming plant built by the Wilfley Mining Machinery Company.



Further means for pre-treatment include chipping machines and swarf-crushing and masticating machines. Sometimes it is an advantage to use swarf-briquetting machines to press chipped or crushed turnings or borings after magnetic separation into metal briquettes of up to 75 per cent. density of solid metal, thus considerably lowering the loss in melting by reducing the surface area.



Figs. 3 (above) and 4 (right). Elevation and plan of a typical lay-out for the Wilfley residues-reclaiming plant.

These briquettes can be plunged beneath the surface of the liquid metal in the reverberatory furnace. Sometimes it is advisable to briquette the borings together with certain quantities of other materials, which otherwise would be blown away in the reverberatory furnace as grindings, buffings, and fine shavings. Binders and even fluxes can be added to the briquettes, *e.g.*, water glass, soda ash, broken glass, fluorspar, etc.

The Reverberatory Furnace

Reverberatory furnaces in common use for the refining of copper residues are those with 5 to 10 tons capacity, therefore much smaller than the reverberatory furnaces used for copper ore refining. Fig. 5 shows a stationary type of a reverberatory furnace for using coal and coke; Fig. 6 shows a modern variation which can be tilted for pouring and is heated by oil. This type is characterised by an arched roof with a series of arches progressively stepped down to the throat of the furnace. This improvement is claimed by Alexandra Furnaces, Ltd.,[1] to cause a succession of reverberatory actions on the flame.

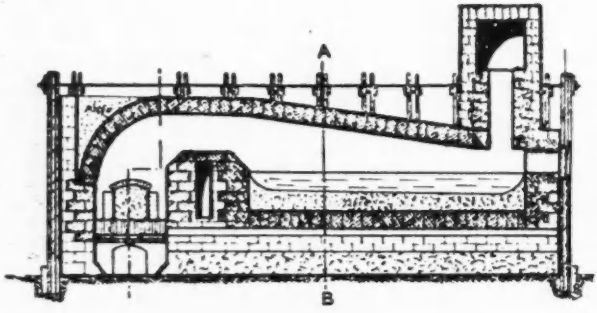
The first question to decide, in constructing a reverberatory furnace, concerns the furnace lining. Antimony and arsenic are difficult to remove in a reverberatory furnace with an acid lining, but much easier in a furnace with a basic lining. In this case the overheating of the copper leads to the formation of oxides which unite exothermally with CuO to form antimoniates and arseniates, which are removed as slag. With an acid lining this method leads to a heavy loss of copper, and it is then better to add to the melt a calculated quantity of CuS, which reacts with antimony and arsenic to give Sb_2S_3 and As_2S_3. To remove lead, especially in large quantities, the presence of adequate quantities of SiO_2 is of importance, a fact which causes serious corrosion in acid-lined furnaces.

In reverberatories with basic lining, however, that is to say when using magnesite bricks, there is another disadvantage, namely, that the lead-oxygen compounds primarily formed remain, because of their specific gravity, inside the liquid metal in the reverberatory furnace and do not rise to the surface. If there is lack of SiO_2 the lead can be only very slowly removed. If the lead content is high it is therefore necessary to have sufficient sand present, to serve as a basis for slag in basic-lined furnaces. Sand serves also as a protection in furnaces with acid lining, preventing premature attack of the open hearth.

Zinc, when present in large quantities, mostly burns away, and the ZnO fumes can be collected, to be used in a zinc-refining plant. Comparatively small quantities of zinc react with the acid lining of a reverberatory furnace, but this reaction results in the formation of a basic zinc silicate with a very high melting point, making any slag very viscous.

These, then, are the main considerations with regard to furnace lining; and it is therefore good practice to have, in a large plant, at least one furnace with basic lining, and two or three with acid lining, in order to meet all possible contingencies.

A very important principle, making for economy and enabling an experienced opera-



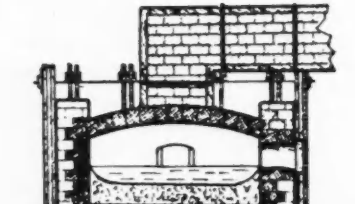


Fig. 5. Section through 5-ton grate, fixed reverberatory furnace.

tor to forecast very closely the analysis of the resulting metal, is to maintain the same mixtures of various residues (obtained from various sources) and to work off one residue against another.

Melting in a reverberatory furnace should be done with a large grate area and a small body. A small well should be provided at the front of the furnace opposite the fire grate for dipping out the metal. The charging door must not be too small; some reverberatory furnaces are built to take bales 3 ft. by 3 ft. by 4 ft.

Often the reverberatory furnace is constructed of silica brick, lined with magnesite except in the charging zone. Silica or sillimanite brick is also used for the arch, which is either horizontal for its full length or stepped down towards the throat. In a stationary reverberatory furnace, a 1½-ft. layer of crushed silica is used for the bottom, below which is a layer of poured slag. The uptake flue should be made as short as possible and branches can lead either to waste boilers or to pre-heaters for compressed air or for heating reducing gases as used in a gas reaction furnace. Solid brick dampers can be dropped through slots to cut off the boilers of pre-heaters as required.

The flue bottom should slope steeply towards the furnace to drain the slag. Often the hearth consists of a stamped mixture of ground silica (carefully graded) and copper hammer scale, with clay as a binder. The latter is not absolutely necessary but it is to be recommended when large quantities are used in the refining process.

Before use the hearth must be thoroughly burnt out; the temperature required in this operation must be raised in proportion to the amount of fireclay used. In making up the hearth, the minimum amount of moisture should be used; the mass may either be

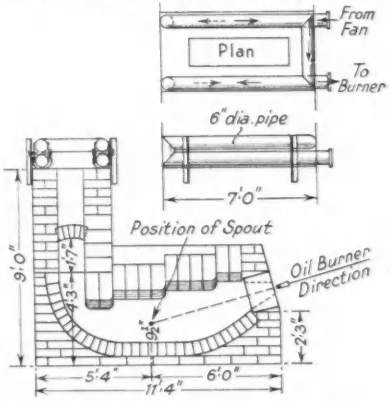


Fig. 6. Oil-fired 4-5 ton furnace (section).

laid in the furnace in layers, each of which is burnt in before the next is laid, or the whole may be laid in one operation and slowly fired to 1500°C. at which temperature it is maintained for 24 to 36 hours.

(To be continued)

Steel Export Statistics

Labour and Shipping Bottlenecks

ENCOURAGING progress in rebuilding U.K. exports of finished steel products is revealed by the latest statistics published by the Iron and Steel Federation. These show that exports for 1945 were about 750,000 tons, valued at £14,000,000.

This achievement is more gratifying when it is realised that two of the largest export sections of the industry, tinplate and sheet, have not been able to participate to any material extent, mainly on account of labour shortage. In addition, although exports restarted at the beginning of 1945, the figure of 750,000 tons was largely achieved in the last half-year, as the rate of output was very restricted until the conclusion of hostilities. In view, however, of limitations, such as the fuel situation, an adequate volume of exports is only likely to be achieved if a similar supply of imported semi-finished material is secured. Continued expansion of exports cannot be achieved unless there is a considerable improvement in transport services.

Home ingot production during the fourth quarter of 1945 at 12.3 million tons was about 1 million tons more than the 1935-38 average figure of 11.2 million tons. Including imports, the total stocks available were 12.5 million tons, almost the same as the 1935-38 average. The following table shows supplies and consumption of steel:

('000 tons per annum: ingot equivalent)

	Home prdtn.	Imports	Exports	Deliveries Home
Average 1935-38... ...	11,257	1,244	2,438	10,044
1943	13,031	2,773	122	15,883
1944	12,142	1,668	240	14,088
1945*	11,808	176	676	11,892
1st qtr.	12,127	413	188	13,140
2nd qtr. ...	11,815	17	394	12,285
3rd qtr.... ...	10,990	74	824	10,815
4th qtr.* ...	12,300	200	1,200	11,460

* Partly estimated.

Important changes are shown in the order-book position. Whereas in November, 1944, the Service and Supply departments were responsible for 71 per cent. of outstanding orders, or 1,566,600 tons, out of a total of 2,188,800 tons, at November, 1945, orders in hand amounted to only 36 per cent. of the total, or 870,600 tons out of 2,408,000 tons.

Metallurgical Education

Joint Committee Formed

IN view of the recognised importance of scientific and technical education—and especially education in metallurgy—to the iron and steel and non-ferrous metals industries, it is satisfactory to note the recent formation of a Joint Committee on Metallurgical Education by the councils of the five leading national metallurgical institutes: the Iron and Steel Institute, the Institution of Mining and Metallurgy, the Institute of British Foundrymen, the Institute of Metals, and the Institution of Metallurgists.

The committee will advise and co-ordinate the policy of the councils on all matters concerning education in metallurgy, draw attention to the requirements of industry, advise those responsible for teaching, and assist parents and masters in guiding boys in the choice of future careers. It will be an important part of the duties of this new committee to supplement the work of the committee on National Certificates in Metallurgy and the activities of the Councils of the participating institutions in raising the status and defining the qualifications of metallurgists. Inquiries should be addressed to the Secretary at No. 4 Grosvenor Gardens, London, S.W.1.

Iron and Steel Output

Figures for 1945

ACCORDING to figures supplied by the Ministry of Supply (Iron and Steel Control) the production of pig-iron and steel ingots in 1945, up to and including December, was as follows:

PIG IRON

	Weekly average	Annual rate
January-September	133,200	6,927,000
October	146,100	7,598,000
November	150,000	7,800,000
December	145,500	7,563,000
Total 1945	136,700	7,107,000

STEEL INGOTS AND CASTINGS

	Weekly average	Annual rate
January-September	223,900	11,643,000
October	243,100	12,640,000
November	246,900	12,839,000
December	221,700	11,528,000
Total 1945 ...	227,300	11,821,000

The December figures show some decline due to the Christmas holidays. The corresponding annual rate of production in December, 1944, was: pig-iron, 6,737,000 tons; steel 11,424,000 tons.

Copper Development Association

Annual Report

FULL-scale activity is to be started again at once by the Copper Development Association, it is stated in the annual report issued on January 14. A new feature of this activity will be the establishment of a workshop at the Association's new centre at Kendals Hall, Radlett, Herts, at which experimental work will be carried out.

In the electrical field, with a view to widening the development of the use and design of copper conductors, the co-operation of all the principal manufacturers in this country has been sought.

Special attention has been given to the use of copper tubes for plumbing and other building purposes, and the Association's work in the engineering and industrial field is stated to comprise phases of metallurgical work, chemical and general engineering, and transport and industrial processes of all kinds. A detailed survey of agricultural and horticultural applications of copper salts is being made as a preliminary to the issue of publications on the subject.

Steel Trade Output Levy

Scrap Equalisation Fund Maintained

THE steel industry is retaining the equalisation fund from which individual manufacturers are compensated for the current discrepancy between scrap and pig-iron prices. Under this scheme a levy is made of 17s. 6d. per ton of steel ingots produced, and from the resulting fund a payment is made of 35s. per ton of pig-iron used in steel manufacture.

It had been generally assumed that all the equalisation schemes in the steel industry had either ceased or would cease by the end of March (*see* THE CHEMICAL AGE of January 5). But the scrap/pig-iron equalisation fund has been retained in order to avoid higher scrap prices.

"LION BRAND"
METALS AND ALLOYS
MINERALS AND ORES
RUTILE, ILMENITE, ZIRCON,
MONAZITE, MANGANESE, Etc.
BLACKWELL'S
METALLURGICAL WORKS LTD.
GARSTON, LIVERPOOL, 19
ESTABLISHED 1869

German Technical Reports

Another List Available

FURTHER reports submitted by teams of industrial experts, who have visited Germany for the collection of scientific and technical intelligence are now available from H.M.S.O. All prices are exclusive of postage.

CIOS XXV—14. *Gebrüder Böhler A.G., Buderich*: Quality alloy steels, tool steels and forgings (2s. 6d.).

CIOS XXV—20. *Dr. Alexander Wacker, Gesellschaft für Elektrochemische Industrie, Burghausen*: Chemical production from acetylene (2s. 6d.).

CIOS XXV—26. *I.G. Farbenindustrie, Mainkur-Hochst*: Crude oil demulsifying agents and miscellaneous chemical products (previously incorrectly numbered *CIOS XV*—26) (3s.).

CIOS XXVI—2. *Synthetic Emulsifying Agents, Wetting Agents, Detergents and Soap Substitutes: I.G. Farbenindustrie A.G. Höchst/Main* (3s. 6d.).

CIOS XXVI—5. *Wirtschaftliche Forschungs G.m.b.H., Stassfurt and Bad Berka*: Petrol and diesel oil-blending stations (1s.).

CIOS XXVI—33. *Werke Kohölyte Luelsdorf*: Plant and organisation of chemical factory (1s.).

CIOS XXVI—35. *Electro Schmelzewerke A.G., Kempten, Allgau, Bavaria*: Use of ceramics (1s.).

CIOS XXVI—60. *Light Metal Production and Development for Aircraft, I.G. Farbenindustrie, Bitterfeld* (1s.).

CIOS XXVI—68. *Wirtschaftliche Forschung G.m.b.H., Eferbachtel.* Fuel blending station (1s.).

CIOS XXVI—69. *Steel Forging Industry of Germany* (1s.).

CIOS XXVI—78. *French Shale Oil Industry* (1s.).

CIOS XXVII—55. *Gesellschaft für Linde's Eismaschinen, Hollriegelskreuth*: Oxygen and nitrogen manufacture and low-temperature separation of hydrocarbon gases (4s.).

CIOS XXVII—69. *The Fischer-Tropsch Plant of Ruhrchemie A.G., Sterkrade-Holten* (8s. 6d.).

CIOS XXVII—79. *Rheinmetall-Borsig A.G., Dusseldorf* (5s.).

CIOS XXVII—83. *A.G. für Stickstoffdünger Knapsack*: Manufacture of calcium carbide, calcium cyanide, acetaldehyde, acetic acid, acetic acid-acetic anhydride, acetone, ferrosilicon, activated charcoal (1s.).

CIOS XXVII—84. *I.G. Farbenindustrie A.G., Ludwigshafen and Oppau*, Wehrmacht items (6s.).

CIOS XXVII—85. *Miscellaneous Chemicals, I.G. Farbenindustrie A.G., Ludwigshafen and Oppau* (8s.).

Industrial Spectroscopy

New Group Formed

AT a meeting held in London on January 23, an Industrial Spectroscopic Group was formed under the auspices of the Institute of Physics. Mr. F. Twyman, F.Inst.P., F.R.S., of Adam Hilger, Ltd., was elected chairman of the Group, and Mr. E. H. S. Van Someren, of Murex Welding Process, Ltd., hon. secretary.

The following were elected to serve as the first committee: Lieut.-Commander J. Convey (Admiralty Laboratory, Sheffield); Mr. B. S. Cooper (Research Laboratory, General Electric Co., Ltd.); Professor H. Dingle (Imperial College, London); Dr. A. G. Quarrell (British Non-Ferrous Metals Research Association); Mr. E. W. H. Selwyn (Research Department, Kodak, Ltd.); Mr. D. M. Smith (Johnson, Matthey & Co., Ltd.); Dr. S. D. Steele (Babcock & Wilcox, Ltd.); Mr. A. Walsh (British Non-Ferrous Metals Research Association).

Membership of Groups of the Institute is open to all interested, non-members of the Institute of Physics paying a nominal fee. Further particulars may be obtained from the Secretary, Institute of Physics, 19 Albemarle Street, W.1.

Barytes from Eire

Exports to Increase

EXPORTS of barytes from the Benbulben deposits in County Sligo are expected to increase at the rate of between 12,000 and 20,000 tons a year in the near future. At present the shipments are being sent to Britain, and surveys to enlarge this trade, as well as to encourage contracts with Sweden and Belgium, are being made. In November, 1945, the last month for which statistics are available, the exports totalled 140 tons, against 30 tons in the corresponding month of 1944.

Mr. F. O'Beirne and Mr. A. Jennings, chairman and managing director respectively of Benbulben Barytes, Ltd., were members of a recent deputation from the town of Sligo to the Eire Department of Industry and Commerce to press for the reopening of a direct shipping service from that port to Liverpool. It was stated that the present cost of sending barytes through Dublin to Liverpool was twice as large as it would be by direct shipment.

MR. ALBERT GASKELL, formerly works manager of the Ocean Chemical Company, Ramsbottom, is the Labour candidate in the first post-war County Council election to take place—on March 4 in the Ramsbottom and Tottington Division of Lancashire.

Personal Notes

MR. E. R. DAVIES, F.Inst.P., Director of Research, Kodak, Ltd., has been appointed hon. treasurer of the Institute of Physics to succeed the late Major C. E. S. Phillips.

MR. R. A. BUTLER, M.P., has been appointed a director of Courtaulds, Ltd., and will devote himself to the company's plans in relation to technical and continued education.

MR. G. F. LAYCOCK has been elected president of the Institution of Mining and Metallurgy for the remainder of the session 1945-46, in succession to the late Lt.-Col. Edgar Pam.

MR. HARRY HITCHEN, now released from special war-time duties, has been appointed Midland and Northern area representative for the chemical plant department of Cannon Iron Foundries, Ltd., Deepfields, nr. Bilston.

DR. HARRY BARRON has left Pirelli-General Cable Works, Ltd., where he has acted as head of the plastics development for almost seven years. He is resuming his pre-war consulting practice in plastics and rubber, and for the time being is operating from 90 Shaftesbury Avenue, Southampton (Telephone 75557).

MR. E. A. O'NEAL has been appointed to the board of Monsanto Chemicals, Ltd., as deputy managing director. Mr. O'Neal has been associated with the Monsanto Chemical Company of St. Louis, Missouri, U.S.A., since 1926, and since 1941 has been production manager of the Phosphate Division of that company.

DR. J. ELIOT HARDY, until recently Chief Plant Protection Officer of the Government of Palestine, has joined the staff of Technical Products, Ltd., as senior agriculturist concerned with the development, both in England and overseas, of chemical and other special products derived from petroleum for use in agriculture.

SIR WILLIAM LARKE is retiring from the directorship of the British Iron and Steel Federation on March 31. Appointed director of the National Federation of Iron and Steel Manufacturers in 1922, he has been associated with the progressive organisation of the industry since that date, culminating in the creation of the British Iron and Steel Research Association last year.

Obituary

MR. FEDERICO LESSER, who died in London on January 18, aged 75, after a long-illness, was joint managing director of Borax Consolidated, Ltd. He had been with the company 47 years and before coming to England had looked after the company's interests in South America.

Parliamentary Topics

Raw Materials

WHEN the House reassembled on January 22, after the recess, Mr. Norman Smith asked the Prime Minister whether, in view of the difficulties in paying for imports, he would direct scientific research to the substitution of home-produced for imported raw materials used in British factories.

The Prime Minister: The circumstances of war have already obliged us to do our best to substitute home-produced for imported materials within the limitations imposed by our natural resources. The Government consider that these efforts should be continued both by the Government and by industry, with the full support of scientific research, in such a way as will contribute effectively to the solution of our balance of payment difficulties.

Quality of Penicillin

Sir H. Morris-Jones asked the Minister of Health whether he was aware that recent supplies of penicillin made by English manufacturers had been found unsatisfactory and inferior to the U.S.A. product; and whether he would investigate the matter.

Mr. Bevan: I understand that there have been complaints about the relative insolubility of some samples of British penicillin, but there have also been complaints about some American penicillin. Supplies of British penicillin have now greatly improved in quality and in some cases are being asked for in preference to American.

Research Associations

Mr. Cobb asked the Lord President of the Council whether he would state the number of privately-operated research establishments to which the Government contributed; the total amount of their contributions to these establishments in 1937 and 1944, respectively; and the total physicist and engineer hours thereby provided to the Government.

Mr. H. Morrison: The number of research associations in 1937 was 23, and 1944, 28. The Government grant paid to these associations by the D.S.I.R. was £138,500 in 1937, and £298,000 in 1944. The number of staff employed by these associations, holding university degrees, was 352 in 1937 and 563 in 1944. The grant paid to the associations and the number of graduated staff employed are both increasing rapidly at present. These research associations are autonomous bodies, and the work which they are carrying out is done for the industries with which they are associated and not for the Government.

New Plants in Brazil

Sulphuric Acid

CONTRACTS have been given to a United States company for the construction of three new sulphuric acid plants, of the contact type, in Brazil. Although the plants will be relatively small, they are considered an important indication of the general industrial expansion of the country. Brazilian materials and equipment will be used as far as possible in the construction. They are expected to be in operation in about a year and will use Texas brimstone as the source of sulphur. The largest will be a unit of a rayon factory in Sao Paulo and will have a daily output of 30 metric tons of 98 per cent. acid. It is expected that other units, such as a carbon disulphide plant, will be added.

A second plant, having a daily production of 10 tons, will be erected in Pernambuco and is scheduled to be in operation by the end of February. Here practically the entire output of acid will be consumed in the manufacture of superphosphate. A third plant to be built in Rio Grande do Sul, will have a daily production of 10 tons of oleum to be used in oil refining.

"Co-ops" Research

Development in Scotland

THE Scottish Co-operative Wholesale Society, Ltd., Glasgow, whose activities in the foreign field have lately been prominent, particularly in connection with the development of petroleum trade between co-operative producers in the U.S.A. and consumers here and elsewhere, is planning a research unit to assist in the development of their various projects. A nucleus has been created around which it is hoped to build a staff of about 100 experts.

Their function would be to maintain research and experiment applied to the many industrial spheres in which the Society is already interested as a manufacturing concern. This policy is already operative in certain fields, and has already produced results which will be demonstrated in due course; and the situation would now appear to be developing where the Co-operative movement is aiming at establishing itself as a major manufacturing force, using the best creative brains, irrespective of political or social status, to allow the movement to compete on equal terms with other major units in the industrial sphere.

General News——From Week to Week

Scottish Tar Distillers, Ltd., Camelon, Falkirk, have been given authority by the Falkirk Dean of Guild Court for extensions to a value of some £6000.

On Monday next the first sod will be cut on the site of a new factory at Kirkstyle, Kilmarnock. The factory, set up by Glacier Metals, Ltd., will employ 400 persons in the manufacture of finished bearings, anti-friction metal, bronze castings, lead bronzes, etc.

The Board of Trade has made an Order (S. R. & O. 1946, No. 89) revoking as from January 31 the Location of Industry (Restriction) Order, 1945, under which a licence was required from the Board of Trade before use could be made of factory or storage premises having a total floor space of 3000 sq. ft. or over.

A new pit is to be sunk by the Glasgow Iron and Steel Co., Ltd., five miles from Campbeltown, Argyllshire, in order to work a coalfield that is estimated to contain 63 million tons of coal. Employment for 300-400 men will be provided as soon as the pit is working, with prospects of a considerable increase.

Medicated soap containing 5 per cent. or more of tetraethylthiuram monosulphide has been added to the list of soaps which may be supplied against medical prescriptions, according to a Ministry of Food announcement.

At the annual general meeting of English Clays Lovering Pochin & Co., Ltd., it was announced that the labour shortage was still curtailing possible output. The tonnage sold for 1945 represented only 45 per cent. of the 1939 volume of home trade, and 29 per cent. of the pre-war volume of export trade. Substantial progress had, however, been made by the company's research branch, which had been fully occupied.

Technical Products, Ltd., advise that on instructions from the Ministry of Supply, the prices of methyl ethyl ketone have been increased as from January 1, by £14 10s. per ton. User price for 10-ton lots of this material is now therefore £76 per ton, d/d, drums returnable. They also advise that their current selling prices for 10-ton lots of naphthenic acids are: N.A.9, £68 15s. per ton; N.A.17, £52 per ton; N.A.20, £60 10s. per ton.

The greater spirit of co-operation now in evidence between the agricultural, food, and medical authorities, was referred to by Dr. L. H. Lampitt when he spoke on "Science and Food" on Thursday last week in the North British Station Hotel, Edinburgh, before the local sections of the Royal Institute of Chemistry, the Chemical Society, and the Food Group of the Society of Chemical Industry. Before the war agriculturists and the food authorities had worked far too much as distinct units, not only in this country, but in others.

Foreign News

Unilever, Ltd., have bought a plot of 70,000 sq. ft. in the industrial zone of Haifa for the construction of a new plant to produce edible fats and possibly cosmetics.

An indicator said to reveal the presence of carbon monoxide gas in concentrations as low as 0.01 per cent. in 1 minute 20 seconds has been reported perfected by a Swedish engineer.

Included in the newly-elected members of the Swedish Chamber of Commerce are Erik Gösta Jonsson of Stockholm; James Miller Son & Co., and Ernest Melville Singer, both of London.

The first blast furnace in operation in Germany is that of the Hoesch Iron and Steel Works in Dortmund, where 3600 workers are again employed. Steel output in January was expected to reach 20,000 tons and coke is also being produced.

The Permanent International Council of the South American Petroleum Institute recently announced its tentative plans for holding a South American Congress on Petroleum, the first of a series, at Lima, Peru, in January 1947.

Large petroleum deposits are believed to occur in the llano region of Colombia, the extensive plains south and east of the Andes. However, it would probably be necessary to prove the existence of substantial resources there to justify the expenditure required to build pipe lines to the coast.

Seeking ways to make the United States less dependent upon foreign sources of manganese, the Bureau of Mines recently completed successful co-operative tests with industry on the use of electrolytic manganese from low-grade domestic ores in the manufacture of acid steel. When an electrolytic manganese produced in a pilot plant at Boulder City, Nev., was substituted for the usual imported ferro-manganese in full-scale commercial heats of steel at the co-operating plants—the Atlas Steel Casting Company of Buffalo, N.Y., and the Detroit Steel Casting Company of Detroit, Mich.—it proved entirely satisfactory and the carbon steels obtained had slightly better physical properties.

Work carried out in the laboratories of the Tata Iron and Steel Co. on vanadium-bearing intermediate manganese cast steels is of special importance, particularly because India is one of the largest manganese producing countries in the world, and manganese is one of the cheapest alloying elements.

A method of producing crystals of sodium potassium tartrate of a size and purity that permit them to be used as piezo elements for precision apparatus to replace piezo-electric quartz has been developed in the Soviet Union. There are now more than 1,000,000 instruments using these crystals, and a large part of the production during the war was used in military equipment.

A concession for a pipeline from Saudi Arabia, to cross Palestinian territory, has been granted to the American-owned Trans-Arabian Pipeline Company by Lieut.-General Cunningham, the Palestine High Commissioner. The concession is an outcome of the Anglo-American oil agreement signed in London last September. It will be about 1000 miles long, and is planned to carry 15,000,000 tons of oil a year.

The iron-ore deposit at Otamaki, Finland, discovered in 1938, is still awaiting development. The deposit, which is 2500 metres in length, has been estimated to contain approximately 100,000,000 tons of ore including large amounts of vanadium and titanium ores. Presumably lack of sufficient capital has kept any domestic firm from undertaking mining operations. If the deposit could be worked, its production would meet all domestic needs for iron ore.

The first of the consultative committees constituted in France by the Minister of Industrial Production (and corresponding somewhat to our "working parties") is that of the chemical industry. It is directed by M. Robin, and comprises four representatives of employers, four of technicians, and four of working personnel. The new committee will play an important rôle not only in technical matters, but also in general politics, and will allow the organisation committees to be discontinued.

Forecasts for 1946 in the report of the Boliden Mining Company, Sweden, indicate a decreased production of copper—12,000 to 13,000 tons as against 18,000 last year. Nickel output has had to be stopped, but exports of arsenic to Britain, Australia, South Africa and South America has been resumed. Lead production is likely to be maintained at 8,000 tons per annum, and the output of iron pyrites will probably be the same this year as in 1945, *viz.*, 200,000 tons. The Boliden mines have also started production of bismuth, and it is reckoned that full Swedish requirements, amounting to 10,000 kg. per annum will be satisfied.

December showed a marked improvement in most branches of the French chemical industry. Production of sulphuric acid increased from 44,340 tons in November to 45,000 tons in December, sodium carbonate from 18,110 to 20,000 tons. There was, however, a reduction in " fat " lime from 52,000 to 35,500 tons.

Swedish manufacturers exhibited plastic products for the first time at a recent industrial fair. Prominently displayed was the polyvinyl chloride material known as " Nopoline." A large chemical fertiliser company displayed melamine resins produced entirely from Swedish raw materials. When fillers are added, the product is known as " Mepal," but without fillers it is made into a water-soluble powder for the glue industry and is used especially by plywood and furniture manufacturers. As Swedish plastic production has increased Sweden's imports have shown a corresponding decrease. Official statistics give imports of plastics during the first six months of 1945 as 100 tons, compared with 890 tons in 1944.

Forthcoming Events

February 4. Society of Chemical Industry (Food Group and London Section). Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1, 6.15 p.m. " The Treatment of Water for Food Manufacturing Purposes." Mr. G. Carter: " Purification of Water for Food Purposes "; Mr. F. Howard and Mr. E. C. Spooner: " Removal of Taints from Water "; and Mr. E. L. Holmes and Dr. E. I. Akeroyd: " The Rôle of Ionic Exchange in the Treatment of Water."

February 5. Electrodepositors' Technical Society (Birmingham Section). James Watt Memorial Institute, Great Charles Street, Birmingham, 6.30 p.m. Dr. J. H. Nelson: " The Reflectivity of Metals."

February 6. Institute of Fuel. Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 6 p.m. Mr. E. C. Evans: " Utilisation of Waste Heat in Metallurgical Furnaces."

February 6. Institute of Fuel. Engineers' Club, Manchester, 2.30 p.m. Mr. A. T. Green: " Factors Influencing the Durability of Refractory Materials in the Carbonising Industries."

February 6. British Association of Chemists (Birmingham Section). Chamber of Commerce, Birmingham, 6.30 p.m. Mr. R. V. Wadsworth: " Insect Pests and the Food Chemist."

February 6. Society of Public Analysts. Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1, 6 p.m. Mr. F. A. Lyne and Mr. T. McLachlan: " Notes on the Selective Oxidation of Vinegar "; Dr. J. A. C. McClelland: " Application of the Intermittent Arc Technique of Spectrographic Analysis," and Dr. J. H. Hamence: " The Determination of Auxins in Soils: including a Note on Synthetic Growth Substances."

February 7. The Chemical Society. Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1, 5 p.m. Dr. F. H. S. Curd and Dr. F. L. Rose: " Synthetic Antimalarials "; Professor H. L. Riley: " Amorphous Carbon " and Dr. C. W. Shoppee: " The reconversion of D-homoandrostane compounds to derivatives of *allo*-pregnane."

February 8. British Association of Chemists (St. Helens Section). Y.M.C.A. Buildings, St. Helens, 7.30 p.m. Dr. J. Abrams: " Chemistry and Cancer."

February 8. Chemical Society (Sheffield Section) and **University Chemical Society.** Chemistry Lecture Theatre, Sheffield University, 5.30 p.m. Mr. E. J. Bowen, F.R.S.: " Light Absorption from a Chemical Standpoint."

February 13. Royal Society of Arts. John Adam Street, Adelphi, London, W.C.2, 1.45 p.m. Professor G. I. Finch: " The Need for Scientific Research into the Prevention and Extinction of Fires."

February 13. British Association of Chemists. Gas Industries House, 1 Grosvenor Place, London, S.W.1, 6.30 p.m. Mr. R. E. Threlfall: " Glass Tubing."

February 13. Institute of Welding. Reynolds Hall, College of Technology, Manchester, 7 p.m. Mr. R. E. Doré: " Review of Modern Developments in Flame Cutting and Oxy-Acetylene Welding Technique."

February 13. Society of Chemical Industry (London Section, Food Group, and Plastics Group). Royal Institution, Albemarle Street, London, W.1, 6.30 p.m. Dr. G. L. Riddell: " Science and Packaging " (The Jubilee Memorial Lecture).

February 15. The Association for Scientific Photography. I.C.I. premises, Billingham, Co. Durham, 4 p.m. Dr. A. E. I. Vickers: " Photography Applied to Physico-Chemical Research."

Company News

Milton Antiseptic Co., Ltd., reports a net profit, for last year, of £39,216 (£29,423). A final ordinary dividend of 10 per cent., making 15 per cent., has been declared.

Timothy Whites & Taylors, Ltd., have given notice to redeem on April 30, the whole of the 5 per cent. debentures outstanding. Holders are invited to exchange into 4 per cent. debentures on the basis of £100 new stock and £1 10s. in cash for every £100 held, plus 6 months' interest to April 30, less tax, on the converted holding. The conversion offer remains open until February 20.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *— followed by the date of the Summary, but such total may have been reduced.)

VINYL PRODUCTS, LTD., Carshalton. (M., 2/2/46.) December 19, £6000 charge, to F. F. Stacy, Fetcham, and another; charged on certain pieces of land at Carshalton. *——. March 16, 1945.

Satisfaction

ENGLISH STEEL CORPORATION, LTD., Sheffield. (M.S., 2/2/46.) Satisfaction January 10, of Trust Deed and supplemental Trust Deeds respectively registered October 7, 1932, January 16, 1935, and December 1, 1936, to the extent of £22,243.

New Companies Registered

Kondan Plastics, Ltd. (23,744).—Private company. Capital £100 in shares of £1. Manufacturers of and wholesale and retail dealers in plastics, synthetics, etc. Directors: K. Cina, D. McAllister. Registered office: 36 Charlotte Lane West, Glasgow, C.1.

Taprobane Trading Company, Ltd. (403,527).—Private company. Capital £500 in £1 shares. Manufacturing, research, dispensing and analytical chemists and druggists, etc. Directors: E. Maxwell, I. Isaacs, I. G. de Zilva, M.D., W. Butler. Registered office: 46 Finsbury Park Road, N.4.

Lamibond Products, Ltd. (403,562).—Private company. Capital £100 in £1 shares. Manufacturers, importers and exporters of mineral, chemical, metal, animal and vegetable products and in particular all kinds of plastic, synthetic, substitute, leather, paper and rubber compositions, etc. Subscribers: J. Lesser, and R. P. Anderson. Solicitors: Forsythe Kerman & Phillips, 44 Brook Street, W.1.

Chemical and Allied Stocks and Shares

INTERNATIONAL politics tended to restrain business in stock markets, where movements generally were small with British Funds less buoyant, although maintaining recent gains. There were numerous individual features among industrial shares, but nationalisation groups became less firm, colliery shares easing, while home railway junior stocks showed fractional declines. A fair amount of attention continued to be given to base metal shares, but generally the mining sections have been less active. The recent strong rise in gilt-edged was tending to influence the yield structure in other directions, and leading industrials again moved higher in price. Demand for the latter was also attributed to the possibility that the next Budget may bring further reduction in taxes. There is talk that E.P.T. may be abolished.

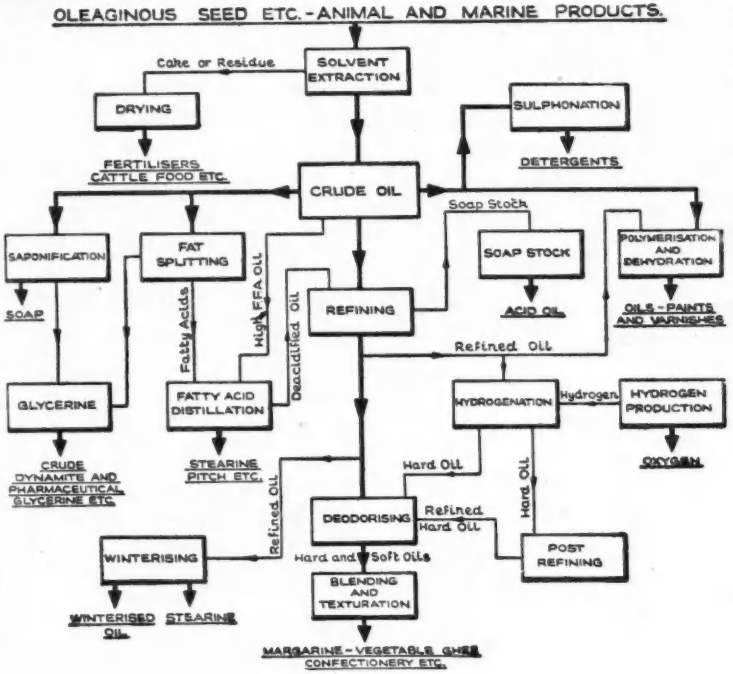
Turner and Newall rose further to 85s. 3d. Dunlop Rubber were in request up to 53s. 9d., while Imperial Chemical showed firmness at 40s. 7½d. and there was a sharp advance to 47s. 6d. in Borax Consolidated deferred. The latter were said to be in demand on American account and there has been revived talk of a higher dividend. American buying also raised British Celanese to 36s. Courtaulds remained active around 57s., and in other directions, there was a sharp advance to 19s. 3d. in General Refractories. Lever & Unilever showed steadiness at 50s. 6d., and United Molasses were in request around 45s. 7½d. Elsewhere, Amalgamated Metal strengthened to 19s. 3d. Imperial Smelting were 15s., and Goodlass Wall 10s. ordinary held firm at 25s. 1½d.

British Glues 4s. shares held their recent rise to 13s. 9d. and the participating preference shares moved higher at 41s. 6d. Barry & Staines were 54s. 1½d. and Nairn & Greenwich remained firm at 82s. 6d.

Steel shares remained firm with Hadfields 32s., Guest Keen 43s. 3d., and Stewarts & Lloyds 57s. 9d., while Tube Investments have been dealt in over £6. United Steel were 25s. 9d., Shipley 28s. 9d., Powell Duffryn 21s., and Clarke Chapman rallied to 51s. 3d. Dorman Long were 25s. 10½d., and in other directions, Allied Ironfounders rose to 55s. Textiles have been inclined to respond to export trade hopes, J. & P. Coats being 52s. 1½d., while Lancashire Cotton were 37s. 9d. and Bradford Dyers steady at 26s. 4½d.

Following their recent advance, British Plaster Board receded to 35s. 6d., but Associated Cement became firmer at 57s. 3d. Shares of companies connected with plastics remained active, but price movements proved small, British Industrial Plastics 2s. ordinary being 6s. 9d., Erinoid 5s. shares 13s. 6d. and De La Rue £10½. B. Laporte were 83s. 9d., Monsanto Chemicals 5½ per cent. preference 23s., and Greeff-Chemicals 5s. ordinary were dealt in around 11s. Burt Boulton & Haywood marked 25s. 4½d. at one time, Cellon 5s. ordinary were again 27s. and elsewhere, Major & Co.'s 2s. ordinary have been dealt in at 3s. 9d. Activity at over 12s. in Canning Town Glass 5s. shares was attributed to hopes of a higher dividend for

BAMAG OIL AND FAT TREATING PLANTS



Bamag Ltd. supply a large range of Plant for the Chemical and Oil Industry including those mentioned in the above chart. Do not hesitate to call upon the services of the Bamag Specialist Chemists and Engineers to help you in the planning of your plant. Full particulars and literature upon request.

BAMAG

BAMAG LIMITED
RICKETT STREET, LONDON, S.W.6 Fulham 7761

Sales and Export Dept. :
Universal House, 60, Buckingham Palace Road, London, S.W.1. Sloane 9282

BAMAG LIMITED are on War Office and Admiralty Lists

the past year; the price can be regarded as carrying the whole annual distribution as it is not the practice to make an interim payment. Valor ordinary shares have been dealt in at 6s. Activity around the higher level of 26s. was reported in Blythe Colour Works 4s. ordinary shares. Following the commencement of dealings, British Alkaloids 1s. shares changed hands around 9s. 9d.

Elsewhere, Boots Drug have been firm at 57s. with Timothy Whites 45s. 3d., Sangers 31s. 6d., and Beechams deferred 21s. 3d., while Aspro shares moved up to 30s. 9d. Oils were firmer generally, particularly Anglo-Iranian which moved up to 105s. on more hopeful views of the Persian news. Canadian Eagle Oil shares continued active and elsewhere Ultramar Oil shares showed a sharp rally.

British Chemical Prices

Market Reports

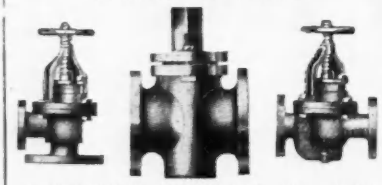
THERE have been no outstanding price changes in the London general chemicals market, and trading conditions have continued more or less along the lines reported last week. Contract deliveries of the leading industrial chemicals are being called for in substantial quantities and no difficulty is experienced in disposing of any available spot supplies. A fairly large volume of export inquiry is being received and this is not limited to any particular section of the market. Almost the whole range of the potash and soda compounds are in good demand and a steady movement continues in acetone, acetic acid, oxalic acid, and British-made formaldehyde. The dearer rates ruling for the lead oxides have not affected the demand which remains steady. Arsenic is in good request. The coal-tar products market is steady with a good demand reported for xylol, naphtha, and the higher grades of cresylic acid. Spot orders for pitch and naphthalene are difficult to place.

MANCHESTER.—Lancashire textile and other industrial users of chemicals are giving a good account of themselves on the Manchester market and a steady flow of delivery specifications for the alkalis and other bread-and-butter lines has been reported during the past week. There has also been a fair amount of new inquiry on home consumption account, while interest in heavy chemicals among shippers has covered a fairly wide range of products. A growing seasonal demand for a number of fertiliser materials is also reported, while crude tar, creosote oil, crude carbolic, phenol crystals and benzol are active sections of the tar products market.

GLASGOW.—In the Scottish heavy chemical trade the improvement shown recently was fully maintained during the past week. Prices remain firm. There is no change in the export position.

BELTING
AND
ENDLESS VEE ROPES
Superlative Quality
Large Stocks - Prompt Despatch
FRANCIS W. HARRIS & Co. Ltd.
BURSLEM - Stoke-on-Trent
'Phone: Stoke-on-Trent 7181.
'Grams: Belting, Burslem

Acid resisting
COCKS . PIPES
PUMPS . VALVES . ETC.
Lennox Foundry Co. Ltd.
Glenville Grove, London, S.E.8
Specialists in corrosion problems

FOR VALVES AND COCKS FOR ACIDS
IN IMPROVED DESIGNS

HAUGHTON'S METALLIC CO., LTD.
30, ST. MARY-AT-HILL, LONDON, E.C.3.

Specialists
in the manufacture of
fine powders
and fillers
DERBYSHIRE STONE LTD., Matlock, Derbyshire

ROBINSONS *Hull*

5" to 14" diameter

2 to 12 gallons capacity

F. ROBINSON & CO., LTD
SOUTHCOATES LANE
HULL
PHONE - 31818-7

THE
BRITISH ASSOCIATION OF CHEMISTS

is the Trade Union for all professional chemists. ONE of its many activities is the UNEMPLOYMENT BENEFIT FUND.

- For a contribution of 2s. 6d. monthly, you can draw £1 a week if unemployed. For 10/- monthly, you can draw £4 per week.
- Over £3,537 paid out in benefits 1935-40.
- Reserve Funds of £38,000.

For particulars of Membership, write to :—
C. B. WOODLEY, 175, Piccadilly,
C.R.A., F.C.I.S., London, W.1
General Secretary, B.A.C.

EDUCATIONAL

Great Possibilities for QUALIFIED CHEMICAL ENGINEERS

VAST and far-reaching developments in the range of peacetime productions and markets of the Chemical Industry mean that the profession of Chemical Engineering will be of great importance in the future and one which will offer the ambitious man a career of outstanding interest and high status. The T.I.G.B. offers a first-class training to candidates for the Chemical Engineering profession.

Enrol with the T.I.G.B. for the A.M.I.Chem.E. Examinations in which home-study students of the T.I.G.B. have gained a record total of passes including—

THREE " MACNAB " PASSES and THREE FIRST PLACES

Write to-day for the " Engineers' Guide to Success "—free—containing the world's widest choice of Engineering courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E., A.M.I.E.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN
219, Temple Bar House, London, E.C.4

FOR SALE

CHARCOAL, ANIMAL, and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., " Invicta " Mills, Bow Common Lane, London, E. Telegrams, " Hill-Jones, Bochurch, London." Telephone: 3285 East.

'Phone 98 Staines.

COPPER Jacketed Still 100 gals. with Condenser; Cast Iron Jacketed Tilting Pan 50 gallons; Jacketed Vacuum Mixer 4 ft. by 3 ft. by 3 ft. 6 in.; Horizontal Pug Mixer Pan 18 in. by 18 in.; 1½ in. Mono Positive Pump; Triple Granite Refiner 22 in. by 11 in.

HARRY H. GARDAM & CO. LTD, STAINES

FOR DISPOSAL.—Enquiries solicited for CYCLOHEXANOL, METHYLCYCLOHEXANOL, and similar solvents. Reply to Box No. 2260, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

JACKETED PANS 1 Copper 36 in. dia. by 36 in. deep.
1 C.I. 36 in. dia. by 36 in. deep.
1 M.S. 48 in. dia. by 36 in. deep.
THOMPSON & SON (MILLWALL), LTD., 60, HATCHAM ROAD, OLD KENT ROAD, S.E.15.

ONE LARGE HOPPER made of mild steel, 20 ft. dia., loading height 8 ft. 6 in., standing on six steel girders, of heavy construction, in sound condition, almost unused. Can be viewed on site Dewsbury, Yorks Apply : MASON, 25, Devonshire Street, Keighley (Tel. : 4143).

FILTER PRESSES
for sale.

TWO Horizontal Cast Iron **FILTER PRESSES**, circular recessed plate type with 26 chambers forming cakes 24 in. dia. by 1 in. thick; centre feed 2¼ in. dia. bottom outlet to each plate.

Horizontal Recessed Plate **FILTER PRESS** by G. H. Remmers, with 12 timber plates 25 in. square forming cakes 15½ in. by 1 in. thick, centre feed 2 in. individual discharge.

Horizontal Timber Recess Plate **FILTER PRESS** by Dehne, with 26 recess timber plates forming cakes 22 in. square by ⅝ in. thick, centre feed individual side bottom discharge.

Horizontal Cast Iron Recessed Plate **FILTER PRESS** by the British Filter Press Co., having 38 recessed plates. Forming 39 cakes each 26 in. square by ¾ in. thick; enclosed centre feed individual discharge.

Horizontal Plate type **FILTER PRESS** by Rose, Downs & Thompson, having 35 circular plates 18 in. dia. ribbed filtering surface, centre feed and ⅜ in. discharge to each plate.

Horizontal Recessed Plate **FILTER PRESS** by S. H. Johnson, with 46 C.I. plates joining 47 cakes 33 in. square by ¾ in. thick; centre feed 4 in. dia. individual tap discharge.

Horizontal Recessed Plate **FILTER PRESS** by S. H. Johnson, 34 circular C.I. plates 36 in. dia. ribbed surface 4 in. centres feed, individual tap discharge; forms ⅝ in. cakes.

GEORGE COHEN & CO., LTD.
STANNINGLEY, near LEEDS and WOOD LANE, LONDON, W.12.

MORTON, SON & WARD, LTD.,
Offer for Prompt Delivery :—

MIXING PLANT
Vertical open top steam-jacketed Mixing Pan, 5 ft. dia. by 9 ft. deep; rivetted M.S. construction, overdriven agitating gear; high pressure jacket. **NEW AND UNUSED.**

STEAM JACKETED PANS
M.S. open top Boiling Pan, 3 ft. 6 in. dia. by 3 ft. deep, flat bottom with run off.
One open top Boiling Pan, 3 ft. dia. by 2 ft. 6 in. deep, dished bottom, with legs.
One open top Boiling Pan, 2 ft. dia. by 1 ft. 9 in. deep, dished bottom, with legs.
One copper steam-jacketed Tilting Pan, 2 ft. 10 in. dia. by 3 ft. 2 in. deep on trunnions.
One copper steam-jacketed Tilting Pan, 2 ft. dia. by 2 ft. deep.
One copper steam-jacketed Tilting Pan, 2 ft. 6 in. dia. by 1 ft. 9 in. deep.

RECEIVERS
Vertical M.S. Rivetted Air Receiver 3 ft. 9 in. dia. by 5 ft. high by ⅜ in. plate. 100 lbs. w.p.

TANKS
Two 750-gallon capacity open top welded M.S. Tanks, 5 ft. dia. by 6 ft. 4 in. deep by ¼ in. plate.
Two 750-gallon capacity totally enclosed rectangular welded M.S. Tanks, 10 ft. by 4 ft. 6 in. by 3 ft. deep by ¼ in. plate. Manhole and bolted-on cover.
One 750-gallon open top rectangular Galvanised Tank, 6 ft. 8 in. by 6 ft. 8 in. by 2 ft. 8 in. deep.
One 6,750-gallon open top M.S. rivetted Storage Tank, 18 ft. long by 10 ft. wide by 6 ft. deep. ⅜ in. plate.
Two—5,000-gallon capacity open top welded M.S. Tanks, 16 ft. long by 8 ft. wide by 7 ft. deep.

HYDRO EXTRACTORS
Two— 48 in. Broadbent all-electric overdriven Hydros, latest type, with oil immersed Star Delta Starters, 400 volts, 3 phase, 50 cycles supply.

WALK MILL, DOBCROSS, nr. OLDHAM.
'Phone—Saddleworth 68

100 HYDRO EXTRACTORS by leading makers from 18 in. upwards, with Safety Covers. Jacketted Steam Copper and Iron Pans. Calorifiers-Washing Machines—Gilled Pipes, etc. List sent on request. Randalls, Engineers, Barnes. Tel. : Riv. 2486.

1000 STRONG NEW WATERPROOF APRONS. To-day's value 5s. each. Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilsons, Springfield Mills Preston, Lancs. Phone 2198.

SITUATIONS VACANT

MEN of Technical training and first class ability are still required for positions with responsibility in the leather trade. Excellent prospects and good remuneration to suitable persons. Write giving brief details of experience, etc., Reptile Dressers, Ltd., Tanner Street, London, S.E.1.

SHORTHAND-TYPISTS wanted for City offices. Five-day week. Also clerical workers. Apply Secretary, Benn Brothers Ltd., Bouverie House, 154, Fleet Street, E.C.4.

SERVICING

GRINDING, Drying, Screening and Grading of materials undertaken for the trade. Also Suppliers of Ground Silica and Fillers, etc. JAMES KENT, LTD., Millers, Fenton, Staffordshire. Telegrams: Kenmill, Stoke-on-Trent. Telephone: 4253 and 4254, Stoke-on-Trent (2 lines).

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East

POLYGLOT TRANSLATION SERVICE LTD. Terminal House, 52, Grosvenor Gardens, London, S.W.1. Tel. SLOane 7059. Translations of every description. All languages.

PULVERISING and grading of raw materials. DOHM LTD., 167, Victoria Street, London, S.W.1.

PATENTS & TRADE MARKS

KING'S PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent), 146a, Queen Victoria Street, London, E.C.4. ADVICE Handbook, and Consultation free. Phone: City 6161.

WANTED

WANTED.—Supplies of Nitre Cake in ten-ton lots. Box No. 2126, THE CHEMICAL AGE, 154, Fleet Street E.C.4.

WE WANT TO BUY

Aluminium Hydroxide	Film Scrap
Aluminium Sulphate	Magnesium Carbonate
Aluminium Stearate	Magnesium Chloride
Alum Potash	Magnesium Oxide
Ammonium Chloride	Manganese Borate
Amyl Acetate	Methylene Chloride
Antimony Oxide	Nickel Sulphate
Arsenic White	Paradichlorobenzene
Barium Carbonate	Sodium Arsenate
Barium Chloride	Sodium Bisulphite
Barium Sulphate	Sodium Phosphate
Calcium Carbonate	Sodium Pyrophosphate
China Clay	Sulphur
Chlorinated Rubber	Titanium Dioxide
Dinitrophenol	Urea
Dry Colours	Trichlorethylphosphate
Factice	Zinc Sulphide

Please submit offers to

WALTER MOESCH & CO.,

Importers of Chemicals,

ZURICH, Switzerland.

CHEMICAL AND GAS ENGINEERING CONTRACTORS

SPECIALISTS IN THE DESIGN AND MANUFACTURE OF COMPLETE PROCESS PLANT & EQUIPMENT FOR—

➡ PRODUCTION, COOLING & PURIFICATION OF INDUSTRIAL GASES WATER GAS, PRODUCER GAS HYDROGEN

➡ CATALYTIC PROCESSING of GASES

➡ REFINING & HYDROGENATION OF OILS & FATS producing— EDIBLE & INDUSTRIAL OILS HARDENED FATS, VEGETABLE GHEE, FATTY ACIDS, GLYCERINE

➡ CALCINATION of LIMESTONE DOLOMITE & MAGNASITE

➡ DUST REMOVAL & RECOVERY

PGC

THE POWER-GAS CORPORATION LTD

STOCKTON-ON-TEES

AND

LONDON, AUSTRALIA, CANADA, INDIA, SOUTH AFRICA

1 9 4 6 LIGHT'S LATEST LIST 6 4 9 1

Organic Research Chemicals

Contains

150

Interesting New Substances.

Copies on request

from

L. LIGHT & CO. LTD.

WRAYSBURY, BUCKS.

GUELPH CASKS

THE GUELPH CASK, VENEER & PLYWOOD CO., LTD.

West Ferry Road,

MILLWALL - LONDON, E. 14

Telephone : East 1489

Also at :

Manchester, England ; Scotstown, Quebec ; and Mattawa, Ontario, Canada.

CRESYLIC ACID

High Boiling Tar Acid

Cresylic Creosote

Naphthalene

Pyridine

MIRVALE CHEMICAL CO. LTD.

Mirfield · Yorkshire · England

STEEL-SHAW PEBBLE MILLS

For the grinding of all kinds of Powders' Chemicals, Minerals, Colours, Paints, Enamels, etc. Supplied lined with hard Porcelain, Silex, or special linings, and can be insulated to suit particular classes of work.

Send for our free illustrated literature

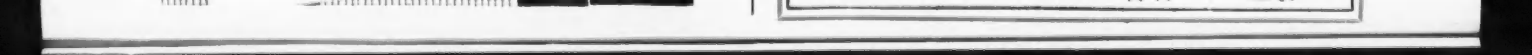
STEEL & COWLISHAW, LTD., *Engineers,*

(Dept. No. 27). **COOPER STREET, HANLEY, STOKE-ON-TRENT,**

London Office : 329, High Holborn, W.C.1

Telphone : Holborn 6023.

Nearly ½ a Century's Experience in Grinding



SODIUM ALUMINATE

HIGHEST QUALITY FOR WATER SOFTENING

WRITE FOR PARTICULARS

PETER SPENCE & SONS LTD.
NATIONAL BUILDINGS ST. MARY'S BRIDGE
MANCHESTER, 3
LONDON OFFICE: 778/780 SALISBURY HOUSE E.C.2

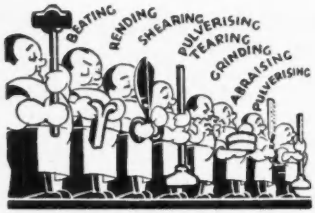
TL 3

INSURE WITH

THE LONDON & LANCASHIRE INSURANCE Co LTD

FULL PARTICULARS
may be obtained from
The
London & Lancashire Insurance Co. Ltd.
7 Chancery Lane, London

THE PULMAC MILL



FOR REDUCING CHEMICALS TO THE FINEST POWDER or GRANULATION MADE

IN FOUR SIZES

INTERNATIONAL PULVERISERS Ltd.
70, VICTORIA ST., LONDON, S.W.1.
Telephone—Victoria 2958.
Telegrams—Pulgrind, Sowest, London.

THE "TEANTEE" STANDARD PORTABLE CONVEYOR

FIXED & PORTABLE CONVEYORS FABRICATED STEELWORK ETC.

14in. Belt. 25ft. Crs.
Suitable for a wide variety of materials

T. & T. WORKS, LTD.
BILLESDON, LEICESTER.
Phone: BILLESDON 261

The inside story of

MITCHELL

RAPID MIXING & STIRRING UNITS

THE only thing that really matters is what happens inside the vessel, and our technical engineers will tell you the inside story whenever you wish. If you wish to have better mixing, better yields, less trouble—then ask us about Mitchell Mixers.

L · A · MITCHELL LIMITED 37 PETER STREET · MANCHESTER

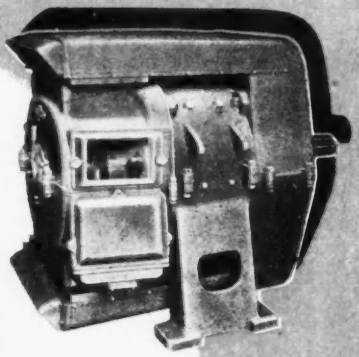
Telephone : BLAckfriars 7224 (3 lines) MX 11.

AEI

For Chemical & Gas Works...

where a totally enclosed Motor is essential

The " Metrovick " totally-enclosed motor with integral fan operated air cooling circuits is designed for use in the corrosive and dusty atmospheres of Chemical and Gas Works.



METROPOLITAN Vickers ELECTRICAL CO. LTD. TRAFFORD PARK · MANCHESTER 17.

MC302

Printed in Great Britain by THE PRESS AT COOMBELANDS, London and Addlestone, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, E.C.4, February 2nd, 1946. Entered as Second Class Matter at the New York, U.S.A., Post Office.